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ABSTRACT

These proceedings contain presentations and summaries of papers presented at a Wheat Competitiveness Conference. They begin with two presentations--"The Wheat Prototype Study within an Overall Conceptual Framework of Competitiveness" (James Langley) and "U.S. Competitiveness in the World Wheat Market: A Prototype Study" (Jerry Sharples). The 23 summaries of contributing reports are divided into four groups. Papers in the section on aggregate analysis of export supply and demand in world wheat markets are "Patterns and Trends in World Wheat Competitiveness" (Mathew Shane), "Measuring Economic Competitiveness in Trade" (Peter Perkins), "Revealed Competitive Advantage for Wheat" (Thomas Vollrath), and "Potential Growth in the World Wheat Market: The Impact of Factors Underlying Demand" (Mervin Yetley). The section on major factors affecting supply, demand, and trade on world wheat markets contains "Forces That Could Expand U.S. Wheat Exports: Estimates from a World Wheat Trade Model" (Jerry Sharples, Praveen Dixit), "Shortrun Impact of U.S. Macroeconomic Policy on the U.S. Wheat Market" (Mark Denbaly), "The Value of the Dollar and Competitiveness of U.S. Wheat Exports" (Stephen Haley, Barry Krissoff), "Protection and Liberalization in World Wheat Markets" (Nicole Ballenger, Cathy Jabara), "International Transportation and the Competitiveness of U.S. Wheat Exports" (Kay McLennan), "Enhancing the International Competitiveness of U.S. Wheat through Agricultural Research" (Ira Branson, Yao-chi Lu), "The Green Revolution for Wheat in Developing Countries" (Gary Vocke), and "Variability in Wheat Land Values of Major Exporting Countries" (John Sutton). In the section on wheat export markets and factors affecting supply, demand, and trade are "Summary of Export Markets" (John Sutton, Ron Trostle) and these summaries: "The U.S. Wheat Market" (William Lin, Robert McElroy), "The Canadian Wheat Market" (Pat Weisgerber, et al.), "The Australian Wheat Market" (Paul Johnston), "The French Wheat Market" (Mark Newman), and "The Argentine Wheat Market" (Jorge Hazera). In the section on wheat import markets and factors affecting supply, demand, and trade are "Summary of Import Markets" (James Langley, Gene Mathia) and these summaries: "The Mexican Wheat Market" (Myles Mielke), "The Brazilian Wheat Market" (Edward Allen), "The Conduct of Wheat Marketing in North Africa" (George Gardner, David Skully), "The Dynamics of China's Wheat Trade" (Frederic Surls), "The Soviet Wheat Market" (Emily Moore), and "The East European Wheat Market" (Robert Cummings). Other contents include a conference summary and comments by review panels of trade and university economists. (YLB)

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U.S. Competitiveness in the World Wheat Market

Proceedings of a Research Conference, June 1986

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ABSTRACT

The United States is the world's largest wheat exporter and is second only to China in total wheat production. However, the value and volume of U.S. exports and its share of the world wheat market have declined sharply since 1981. The Economic Research Service held a Wheat Competitiveness Conference in June 1986, concentrating on key factors affecting changes in U.S. wheat trade. The 23 papers presented at the conference focused on wheat production, marketing, and consumption in the United States and its four major competitors (France, Argentina, Canada, and Australia) and on six major importers (Mexico, Brazil, USSR, Eastern Europe, North Africa, and China). Those papers are summarized here.

Keywords: Wheat, competitiveness, world market, supply, demand, farm policy, trade policy, macro variables.

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March 1987

PREFACE

Wheat is the king of food grains in international trade, surpassing rice tonnage by a margin of 10 to 1. U.S. farmers produce a major share of that market, but their share has diminished since 1981.

A Wheat Competitiveness Conference was held at the Economic Research Service (ERS) headquarters in Washington, DC, on June 17-18, 1986. Its objective was to review the key factors that determine competitiveness of U.S. wheat in the world market. The conference was a logical step in our search to understand competitiveness and to learn how the United States competes in world agricultural markets.

The proceedings of the Wheat Competitiveness Conference include a framework for visualizing the concept of competitiveness, a description of a prototypical wheat study, and 23 summaries of contributing reports to the wheat study. ERS plans to publish the contributing reports. However, some reports may be combined with other research information before publication.

The proceedings also include a conference summary and comments by review panels of trade and university economists.

ACKNOWLEDGMENTS

The Wheat Competitiveness Study was designed and the Conference was organized by the ERS Competitiveness Research Working Group: John Sutton, Jim Langley, Mark Denbaly, Peter Perkins, Jerry Sharples, and Velmar Davis. The authors of the contributing papers to the Wheat Study deserve special recognition for their willingess to accept and complete their assignment under unusually short time constraints. For helping to review contributed papers and to moderate major sessions at the Wheat Competitiveness Conference, special thanks go to Mathew Shane, John Dunmore, Ron Trostle, and Gene Mathia. Jerry Sharples served as technical leader and Velmar Davis was the overall coordinator of the Wheat Study and Conference. Judith Latham edited and Dee Midgette assembled and typed several drafts and the final copy of the proceedings.

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PART I

INTRODUCTION

THE WHEAT PROTOTYPE STUDY WITHIN AN OVERALL CONCEPTUAL FRAMEWORK OF COMPETITIVENESS

James A. Langley

The study of economics consists largely of creating a mental model of a whole economy that serves as a framework within which to put each question as it arises. Once one has such a model, points made by others can be assimilated into what becomes an individual's personal way of seeing things. The purpose of this section is to suggest one such framework regarding competitiveness.

Competitiveness is generally defined here as a nation's ability to produce and market products in international trade while earning a level of returns to the resources (both human and physical) used to produce those products. This level must be at least comparable to what those resources could earn in alternative activities. Maintaining competitiveness involves a nation's ability to adjust the mix of resource use, the prices paid for those resources, and the mix of products produced to changing market conditions. The ability to adjust to changes in market conditions implies a need to focus on the longer term dynamic aspects of market performance.

Suggested Framework

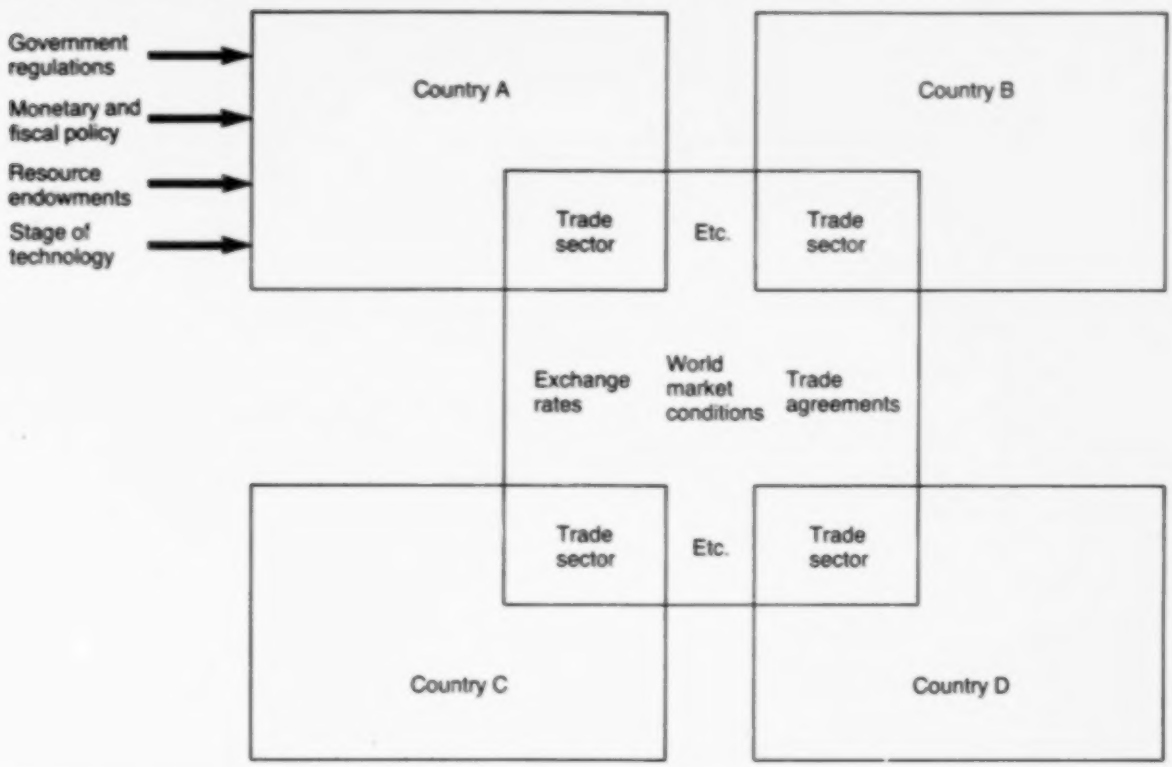
The conceptual framework for the study of agricultural competitiveness is based on the schematic in figures 1 and 2. The overall objective is to identify the relative importance of, and the interrelationships among, factors affecting the competitive position of U.S. agricultural products. This task includes short- and long-term factors that affect both agriculture's economic position in relation to the rest of the domestic economy and the U.S. agricultural position relative to the rest of the world. These diagrams treat the nation as the appropriate aggregation level for international trade. Only four countries are used for illustration (fig. 1).

The domestic economies of Countries A, B, C, and D depend on their resource endowments, stage of technological development, domestic monetary and fiscal policy variables, and existing and cumulative effects of government regulations. The world market for agricultural and manufactured commodities is made up of the trade sectors of each relevant nation. Each trade sector brings the impacts of world market conditions, relative exchange rates, trade agreements, and other international market conditions to bear on domestic producers and consumers. Adjustments within individual sectors of each domestic economy may also be transmitted to the trade sector of other countries, depending on their trade policies, tariff and subsidy regulations, and other protective measures.

The domestic economy of a representative nation, Country A in this case, is displayed in figure 2. Each nation is assumed to consist of six sectors: domestic household, farm, agribusiness, manufacturing and service, government, and trade.

Figure 1

Diagram of competitiveness at the international level



The domestic household sector provides the economy with the basic factors of production--land, labor, capital, and management services--in exchange for factor payments (represented in fig. 2 by dotted lines). These factor payments, along with any government transfers, are used to purchase products from the agribusiness and the manufacturing and service sectors.

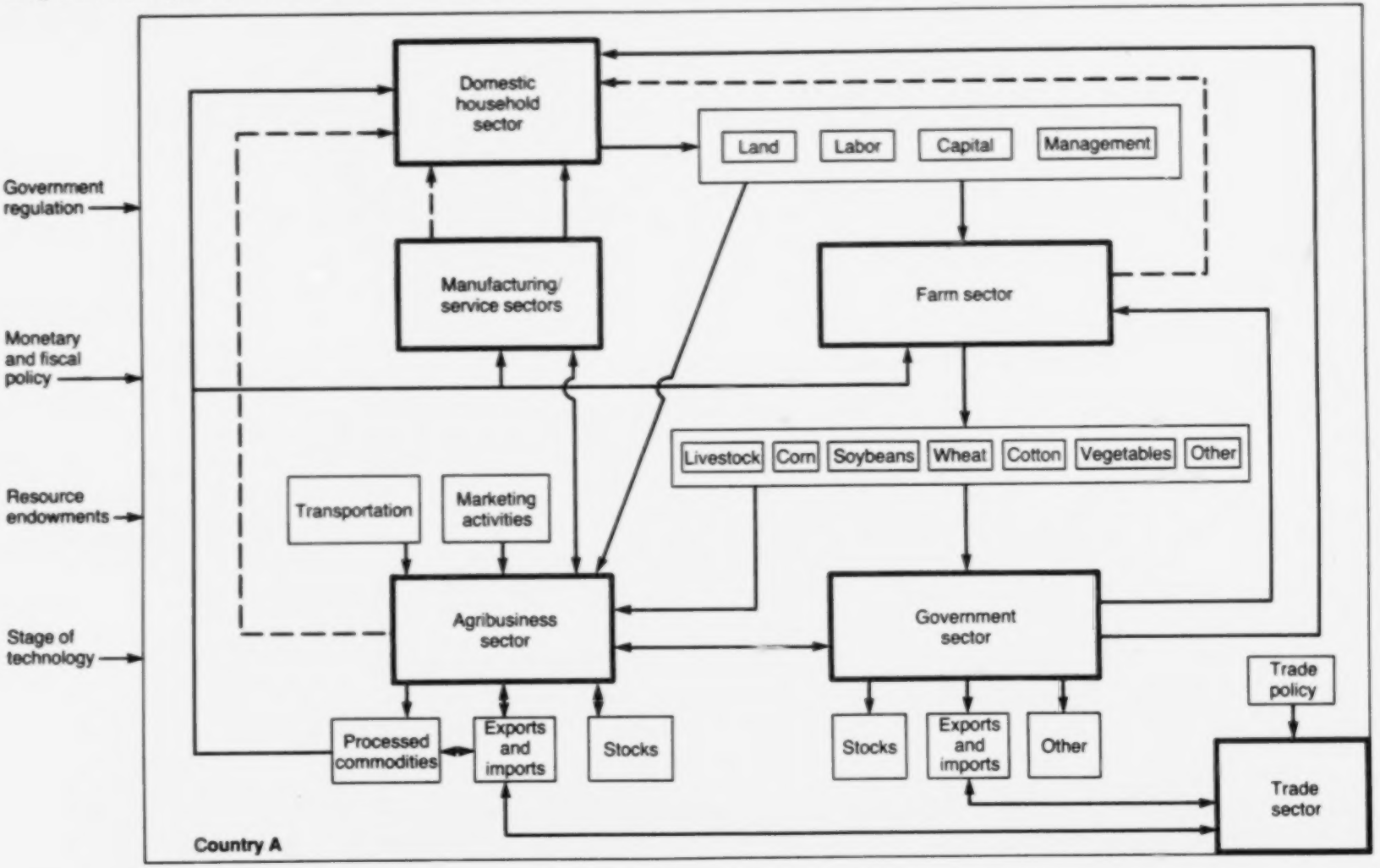
The farm sector competes with the other sectors for the basic factors of production, which it combines to produce a set of commodities. Some inputs to the farm sector may be purchased from the agribusiness sector (some of which may have been imported) or produced on the farm.

The output of the farm sector serves as input into both the agribusiness and government sectors. Agribusiness combines raw farm commodities with other inputs, such as transportation and other marketing services, to produce processed commodities for domestic and foreign consumption, exports or imports of raw farm commodities, purchased inputs for the farm sector (fertilizer, pesticides, and seed), and other products.

The government sector sets the rules under which the whole system operates, and it collects taxes from and pays subsidies to the other sectors. The government obtains output from the farm sector by means of agricultural policy programs or by direct purchases of processed farm commodities from the agribusiness sector. The government may store the commodities, export or import them (with or without subsidies or taxes), or provide other services.

Figure 2

Diagram of competitiveness at the national level



The manufacturing and service sector competes for primary inputs within the nation and provides the primary employment base in many countries. Trade in manufactures and industrial products provides significant foreign exchange to import agricultural products, and vice versa, depending on the country.

The framework just outlined indicates the major factors necessary to study competitiveness and provides a guide to the types of relationships that may need to be estimated for each country. This framework stresses that the real issues are the comparisons and tradeoffs among crops and among nations.

From General Model to Wheat Prototype

The Wheat Prototype Study abstracts from this general framework. It focuses on the portion of wheat production that enters the trade sectors of each country. Factor inputs are assumed to be constant. The manufacturing and service and the domestic household sectors are not explicitly addressed. Figure 3 shows the portions of the general framework covered by the Wheat Prototype Study.

The Wheat Prototype Study consists of individual pieces devoted to various aspects of this conceptual framework. Eleven case studies contain details about the economic and political aspects of wheat consumption, production, and marketing in each of five exporting and six importing nations. Complementing these studies is a set of papers on measures of competitiveness, the role of ocean transportation, implications of macroeconomic policies on the U.S. wheat market, the aggregate analysis of export supply and demand, the role of technological adoption, and simulations of selected scenarios. We do not attempt to construct a single empirical model to analyze questions of competitiveness in the world wheat market. The conceptual model outlined in figures 1 and 2 indicates instead where individual pieces fit into the overall scheme of things. Linkages between all sectors are also indicated.

We hope the creation of this mental model will serve not only as a framework in which to direct questions as they arise but will also suggest new questions and hypotheses about future research directions. A list of researchable issues suggested by this framework follows:

- What are the potential long-term changes in the volume and pattern of international trade, and what are the implied structural changes in how people in the affected domestic economies earn their living?

- How will asset values and resource allocation in agriculture change at world alternative equilibrium price levels?

- What are the adjustment costs of reallocating resources to other uses? How will foreign competitors react to these domestic adjustments?

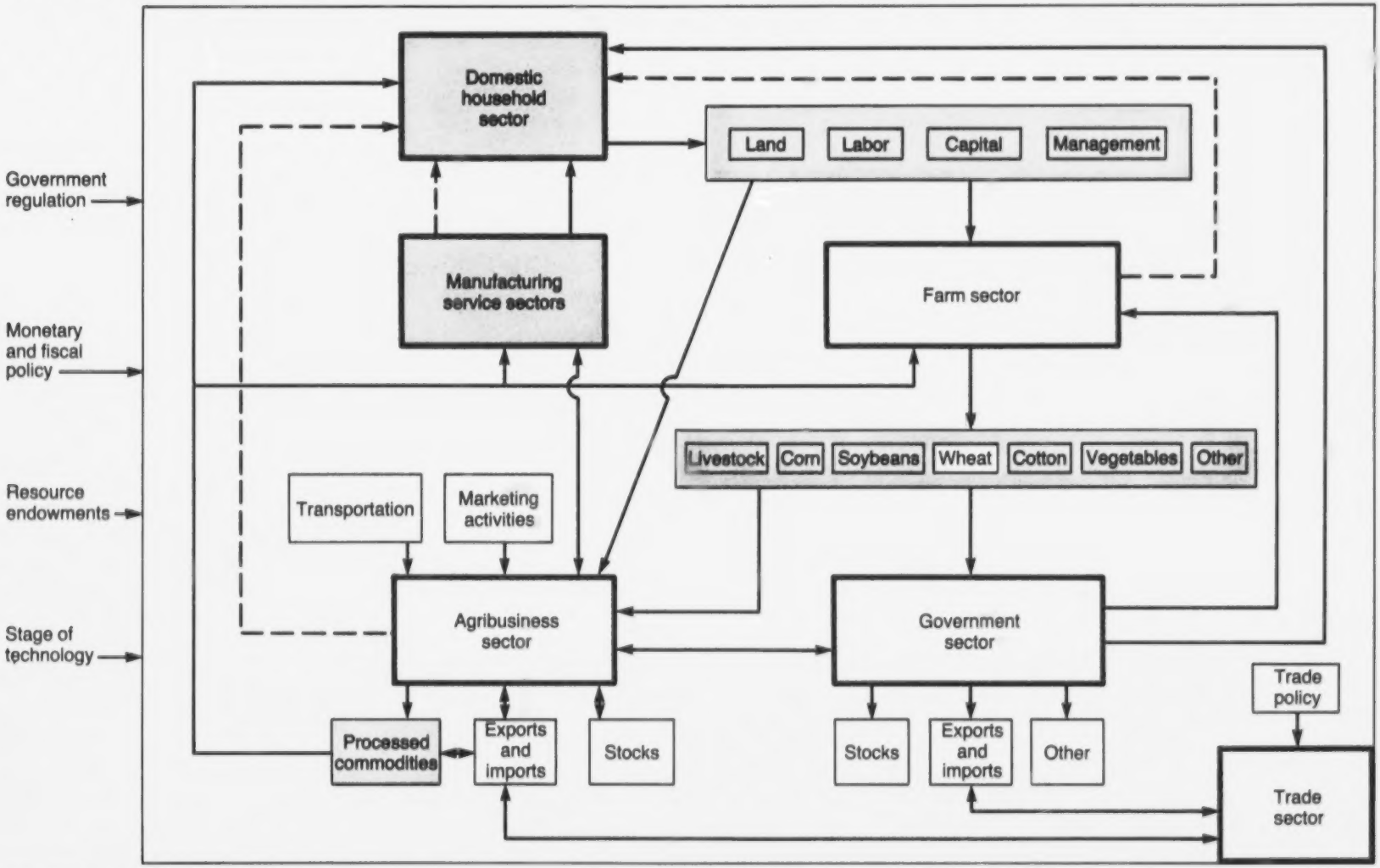
- What are the political and social costs and benefits of structural adjustments in particular sectors of the economy?

- What is the distribution of returns to resources along the marketing chain?

- How do specific resource adjustments get built into the system because of external factors (for example, exchange rates, interest rates, government policies)? How do they reverse themselves when those external factors change?

Figure 3

Focus of wheat prototype study



Note: Shaded areas were not considered in the wheat study.

- What is the adjustment path in the agricultural sector to changes in these external factors? What are the time lags involved? Are there any leading, lagging, or coincident indicators that one can follow to predict adjustments in the agricultural sector?

- What are the costs, in terms of government payments and resource allocations, of increasing an exporting country's market share of international trade?

- What are the estimated elasticities of transformation and substitution between production processes and inputs?

U.S. COMPETITIVENESS IN THE WORLD WHEAT MARKET: A PROTOTYPE STUDY

Jerry A. Sharples

Economists have focused considerable attention on the issue of "competitiveness" in recent years. In the United States, significant changes in the exchange value of the dollar, deterioration of the Nation's external trade balance, and financial stress in its export sectors (including agriculture) have motivated interest in the question of what determines a nation's ability to compete in world markets. The Economic Research Service (ERS) is, therefore, giving competitiveness research special emphasis. As a first step in developing that research, we initiated a prototype study of U.S. competitiveness in the world wheat market.

Objectives

The Wheat Prototype Study has two objectives: (1) to help the public better understand the competitive position of the United States in the world wheat market and (2) to help ERS design a more comprehensive research program on U.S. competitiveness in world agricultural markets. The first objective will be achieved through published reports from this study. The second objective will be achieved as participants and their supervisors learn by doing--that is, by trying some research activities without investing a large amount of time and by then observing what works and what does not. The experience is expected to be useful in the design of future competitiveness research.

We will address both objectives during this conference. The conference is a vital intermediate step in the process of developing reports and evaluating results. It is an input, not an end product. We will present some tentative conclusions based on all draft papers. This conference provides the first opportunity for most of the authors to view the factors affecting the world wheat market with the benefit of all papers. Some authors will likely modify the emphases in their own papers after the conference.

Organization

This is a "prototype study," which means several things:

(1) It is a learning device to help design future competitiveness research.

(2) The scope of the study is limited. The time constraints were very tight. One does not want to invest a lot of time in a prototype because the main job is still to be done.

(3) The study provides an opportunity to try things, to experiment, and to take some risks.

The wheat study consists of 23 projects. Each project is designed to stand alone and to lead to a publishable product with author recognition. The projects have a few common bands. First, all focus on some aspect of the world wheat market. Second, all focus on research questions that relate to U.S. competitiveness in that wheat market. And third, all are linked by economic theory (discussed in the next section).

A Competitiveness Model

"Competitiveness" is a word used by practitioners, not by economic theorists. There is no body of received economic theory of competitiveness. To conduct economic research on the topic of competitiveness, however, one needs a working definition that has economic content.

We want to understand better the factors determining U.S. competitiveness in the world wheat market. How does one observe competitiveness? A simple measure is whether or not the United States does in fact sell wheat on the world market. In a pragmatic sense, if wheat is sold, the United States must be competitive. Though simple, this definition is not very revealing. Of more interest is a change in a country's market share relative to another country. One can speak of a country's becoming more competitive when its share of the export market increases. The issue of competitiveness receives most attention, however, when one's share is decreasing; that is, when the country is said to be less competitive.

More important than terminology, however, is the question of what makes a country competitive in the world wheat market. Economic theory provides a basis for identifying important factors. Consider a simple, static, three-country world wheat model (fig. 1). Suppose Country 1 (United States) and Country 2 export wheat, and Country 3 imports wheat. Let lines S1 and S2 represent the relationship between world wheat price and wheat exports (that is, excess supply) of the two exporting countries. Let D3 represent the relationship between world wheat price and wheat imports (that is, excess demand) of Country 3. For further simplicity, assume all prices are denominated in U.S. dollars and there is no transportation charge for shipping wheat. Because world price is on the Y axis, lines S1 and S2 also measure the marginal costs of getting wheat to the port for export. Those costs include the usual private costs of production and marketing, government taxes, subsidies, and other interventions.

The world market clears for our homogeneous wheat commodity at price P with Country 1 exporting Q1, Country 2 exporting Q2, and Country 3 importing Q3 (note that Q3 = Q1 + Q2).

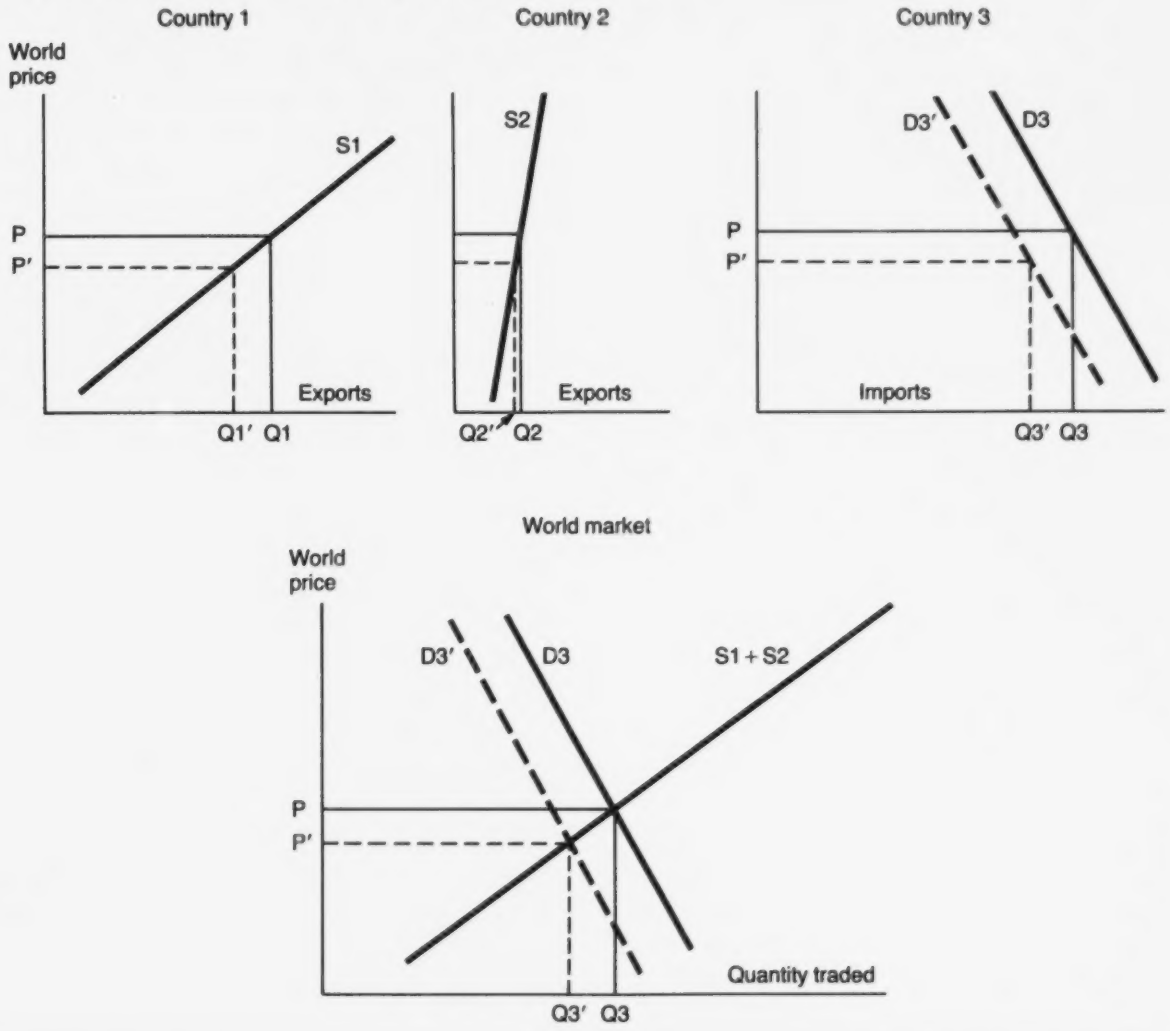
According to our simple definition, both Countries 1 and 2 are competitive in the world wheat market; that is, they both export wheat. One also can observe market shares. Country 1 has a market share of Q1/Q3, and Country 2 has a share of Q2/Q3.

Suppose that for some reason Country 3's excess demand for wheat imports is reduced to line Q3' (fig. 1). The world market now clears at price P'. Note that Countries 1 and 2 still export wheat, but that their shares of the market have changed. The citizens of Country 1 will likely observe that their wheat has become less competitive on the world market because their share has declined.

This simple example shows the importance of importing countries in a study of wheat market competitiveness. A shift in total import demand will affect market shares as long as there are differences in the price elasticities of the excess supply functions of exporting countries. The latter condition seems to be a reasonable assumption for the world wheat market. The assertion by many economists that the United States is the residual supplier suggests that they believe the United States has the most elastic excess supply function for wheat.

Figure 1

Hypothetical wheat market in a three-country world



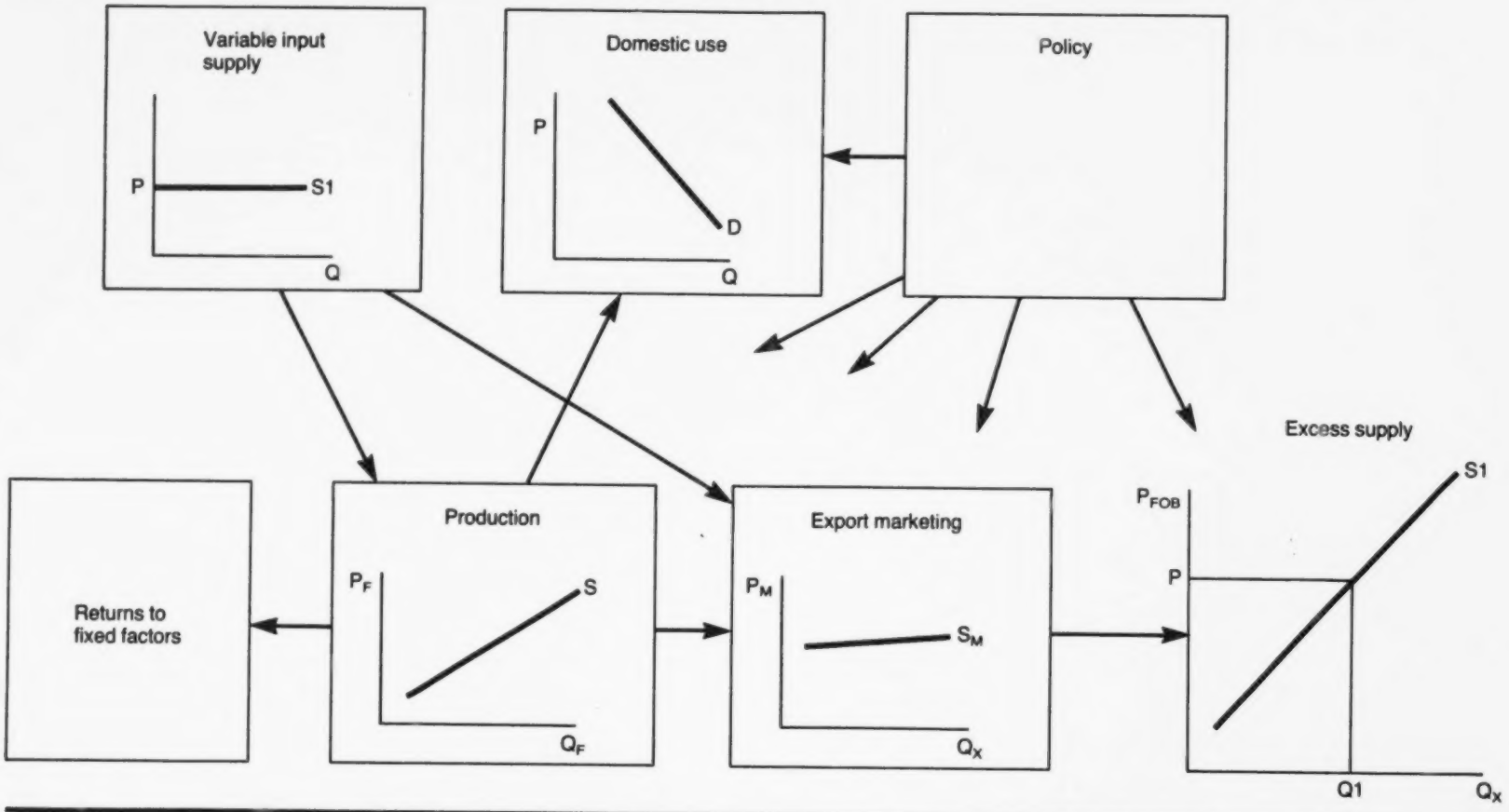
The wheat competitiveness study examines the factors that influence (that is, shift the functions or change the slopes of) the excess supply function for U.S. wheat and the excess supply and excess demand functions for major competing and import markets, respectively. Further, the study goes behind those functions to examine domestic supply, demand, and policy.

Major Wheat Exporters

Figure 2 simplifies the domestic wheat market in major wheat-exporting countries. Note that figure 2 is linked to figure 1 by the excess supply function, S1. Of major interest is the production and marketing chain that leads to exports. Domestic policy influences the whole process. Producers combine their fixed resources with variable inputs to produce for both the domestic and export markets. To examine the wheat sector in isolation, one

Figure 2

Diagram of the wheat sector, United States and other major exporters



assumes that variable input prices are given. For longer term analyses, however, changes in input prices could have a major impact on competitiveness.

Wheat exports go to port through a domestic marketing chain that also uses fixed and variable resources. Export marketing is emphasized because it is a service whose cost varies considerably among exporting countries. Some argue that a major reason that the United States will remain competitive in world grain markets is because of its excellent low-cost marketing system, which utilizes rivers and deep ports. In some exporting countries, these marketing costs are much higher.

In the short run, the fixed factors in wheat production and marketing are the residual claimants of profits. Fixed factors include investment and family labor. This is one of the places where the abstract curves touch real people in the wheat sector. Wealth is gained or lost. Owners and operators succeed or fail.

Costs of Production and Marketing

One way to compare the structure of production and export marketing across wheat-exporting countries is to compare costs of these services per unit of export--for example, per metric ton. Cost comparisons must be used with care. First, cost at the port (f.o.b.) is more appropriate than cost at the farm gate. Figure 2 shows that a competitiveness study should examine costs of production and marketing (COP&M), not just cost of production (COP).

Second, data on COP&M (as they are usually obtained) show variable costs and residual returns to fixed factors associated with getting the average, not the marginal, unit of production to market. For example, suppose the United States exported Q1 of wheat at price P in a given year (fig. 2). A typical cost study would show average variable COP&M and average returns to fixed factors. Government taxes and subsidies would also be included. We would know how the average ton was produced and marketed, but we would not know the cost components of the marginal ton. It is the marginal ton that adjusts to changing prices. In theory, total costs would equal marginal cost and price.

Third, total COP&M is not very interesting because it reveals little about competitiveness. Theory suggests that total COP&M in each exporting country will equal that country's f.o.b. price. If the law of one price holds for the global wheat market, then differences among estimated COP&M across countries would be caused by either (1) intercountry transportation and handling costs or (2) measurement problems.

Fourth, estimates across countries of the COP&M represent costs at just one time. One can conclude little about longer run competitiveness because relative costs can change so rapidly. However, most interesting competitiveness issues relate to the dynamics of change over time. For example, a 30-percent change in the French franc relative to the U.S. dollar could occur in less than a year. Thus, French production and marketing costs per unit, denominated in dollars, would likely change about 30 percent relative to U.S. costs. The instability of exchange rates reduces the usefulness of cost estimates.

So, given all the problems, are COP&M estimates useful in understanding competitiveness? They have some value. The components of each country's COP&M illustrate differences in production and marketing structure, technology, and policies among countries. The data are useful in showing

which components of costs are most important in each country. They are also useful in showing the type of linkages (in terms of cost per unit) shown in figure 2.

Importing Countries

Many factors that determine an importing country's position in the world wheat market may be summarized in an excess demand curve as shown for Country 3 in figure 1. That curve represents static domestic supply, demand, and policy conditions. Thus, it shows the net impact on wheat import demand, for a given time, of all factors affecting domestic production, marketing, and consumption. Changes in any one of these factors would shift the importing country's excess demand function and change the world wheat market faced by each wheat-exporting country.

World Market Clearing

Figure 1 shows how our simple static model of the world wheat market clears to determine world price and quantities traded. Though not shown, two more components can be added to make the model more useful: (1) domestic currencies and exchange rates and (2) transportation costs among exporting and importing countries.

Using the Model to Study Competitiveness

Though the simple model presented here is static, it provides a useful framework for studying competitiveness. U.S. competitiveness in the world wheat market is determined by dynamic factors--shifts in the wheat excess supply functions of the United States and its competitors and shifts in the wheat excess demand functions of importers. The static model represents the state of all these dynamic factors at one point. The dynamic nature of the world wheat market may be approximated with this model by shifting excess supply or demand curves and comparing static solutions.

To understand the past and speculate about the future, one needs to understand these dynamic forces that shift excess supply and demand functions. Economic theory suggests that it is useful to examine these forces over two time horizons: (1) short run, and (2) long run.

Shortrun Analysis

The short run in this case refers to about 3-5 years. Shortrun analysis is based on the assumptions that the infrastructure for production and marketing is given, technology is known, investment in the sector is fixed, prices of variable inputs are given, and demand is stable.

Shortrun analysis focuses on dynamic factors related to business cycles, stochastic production, and policy changes that can shift wheat supply and demand functions. Variability and uncertainty are major features of the short run. Large shifts can take place in exchange rates, interest rates, foreign exchange reserves, and employment. Major shocks in global wheat production or consumption also play themselves out over several years in the form of stock accumulations or depletions. Policy changes have a 3- to 5-year impact. It may be more accurate to say that economists really cannot trace impacts beyond 3-5 years. Finally, analysis of COP&M helps provide a shortrun picture of the wheat market.

Longrun Analysis

A different set of factors comes into play in the long run. Business cycles are assumed away. Production is "normal." Factors assumed fixed in the short run are variable in the long run. Within this longrun conceptual framework, one can examine the dynamics of competitiveness.

The longrun competitiveness of a country in exporting wheat (or other commodity) on the world market is determined mainly by six types of factors:

(1) Natural endowments. This factor defines a basic level of production and export potential and is especially important for agricultural commodities. The endowment includes quality of land (for example, slope and fertility), availability of water, climate, navigable river systems, and deep harbors.

(2) Investment, both public and private, in the production and marketing infrastructure. Investment augments the natural endowments to give a production possibility at a specific point.

(3) Opportunity cost of inputs. This factor is determined by the rest of the economy. It is exogenous in a one-sector competitiveness study. The opportunity cost of land is determined mainly by other agricultural commodities. Labor's opportunity cost is determined by a country's stage of development--that is, its per capita income and income distribution. The opportunity cost of labor to the wheat sector is expected to increase with development. Capital's opportunity cost is also determined by supply and demand factors outside the sector being studied.

(4) Technology. Technology determines the physical inputs needed to produce and market a unit of wheat. Research and development increase physical efficiency.

(5) Demand. Demand in all countries is shifted by per-capita income growth and population growth over time.

(6) Public policy. Public policy influences all these factors. A nation's public policy needs to be understood in terms of its apparent public objective function, especially in the case of traded agricultural commodities. A commodity like wheat plays a more important role in that objective function than simply producing national income. Social objectives associated with producing and marketing wheat are also driven by national desires for self-sufficiency in basic foodstuffs, for rural employment to control migration, for the maintenance of a socially desirable standard of living, and other "noneconomic" purposes.

A country's competitiveness in the world wheat market over time will change as these factors change. Husbandry can improve natural endowments. Investment improves human and physical capital to expand the resource base. Opportunity costs change with national growth. Technological breakthroughs occur in the form of higher yielding varieties and better transportation and handling methods. Public policy can speed up or slow down these forces. Technology might be quite mobile across competing countries, but the other factors would likely be country-specific. Over a span of 20 years, those factors could vastly change a country's competitiveness in the world wheat market.

All of these factors determine U.S. competitiveness in the world wheat market. Some are under U.S. control and others are not. For example, the United States invests in research to lower its costs of wheat production and marketing. However, the United States has only limited control of the transfer of new technology to other countries and no control of research investments by other countries. Thus, U.S. competitiveness in the world wheat market is determined by actions of other countries as well as by actions of the United States.

The Research

The wheat competitiveness study is comprised of 23 individual projects. Some focus on wheat-exporting countries and examine the shortrun and longrun factors that either have shifted or will shift their wheat excess supply functions. Other projects examine wheat-importing countries, focusing on factors behind their excess demand functions. Still other projects examine factors that cut across many countries, such as trade policy, ocean transportation, macroeconomic variables, and technology.

All projects are linked by the conceptual framework of the static partial equilibrium model. Some go beyond the assumptions of the simple model to examine wheat classes and other issues. However, little formal modeling and estimation for the wheat study are being done. Most of the work is descriptive, pulling together the knowledge of a diverse group of experts and focusing it on the issue of wheat competitiveness.

PART II

AGGREGATE ANALYSIS OF EXPORT SUPPLY AND DEMAND IN WORLD WHEAT MARKETS

PATTERNS AND TRENDS IN WORLD WHEAT COMPETITIVENESS

Mathew Shane

The world market is dynamic and competitive. The volume and value of both exports and imports reflect the interaction of fundamental factors affecting country-level supply and demand as well as policies affecting both domestic and international markets. Thus, trade involves numerous interactions: resource endowment, techonology, and availability and quality of factor inputs on the supply side; income, population, tastes, substitutes, and marketing infrastructure on the demand side; and domestic commodity and general macroeconomic policies affecting world trade. Therefore, realized exports and imports reflect both the fundamental factors underlying comparative advantage and the policy and macro factors which modify the comparative advantage of a country to reflect relative competitiveness.

Using changes in wheat trade from 1961 to 1984 and trend projections to 2000, countries were grouped according to their contribution to net wheat export growth. In this way, one can separate countries with large contributions to growth from those with small contributions. Using this technique, one can observe patterns and trends in world wheat competitiveness. Although I do not disaggregate the effects of different factors, it is the interaction of all these factors (both the comparative advantage and competitive ones) that determined the pattern of world wheat trade in 1961-84 and that will affect the outcome in the years ahead.1/

World wheat trade is highly concentrated on both the export and import side. Of 114 countries, 13 accounted for more than 95 percent of wheat exports, and 18 accounted for more than 71 percent of wheat imports in 1981-83.2/

The United States is clearly the dominant exporter with more than 40 percent of world exports in 1981-83. However, its dominant position is facing increasing competition. Eight of the major exporters in 1981-83 were importers in 1961-63. Two countries, France and the United Kingdom, had combined changes that increased their net export market share by 23 percent of the world total.

The major importers, accounting for more than 71 percent of imports in 1981-83, had accounted for only 25 percent in 1961-63. The USSR, a significant exporter in 1961-63, was the largest single importer in 1981-83, accounting for more than 20 percent of imports.

1/ References to wheat trade includes wheat flour as well as wheat.

2/ The 114 countries covered by this study include all categories of countries, but exclude small countries that present data problems.

The developing countries became increasingly important as markets for wheat. From 1962-82, they accounted for more than 55 percent of net import growth. This pattern could become even more significant as they are projected to account for more than 63 percent of net import growth between 1982 and 2000. The industrial market economies dominate net exports with approximately 80 percent of net export growth both in the historical and the projected periods.

The significant wheat exporters as a group have become more important than the United States, and this trend is projected to continue to 2000. Comparing the ratio of projected exports of the major export competitors with those of the United States, one can see that the principal loss of market share has been to the EC. This loss of competitiveness reflects the long-term impact of the EC's Common Agricultural Policy.

MEASURING ECONOMIC COMPETITIVENESS IN TRADE

Peter R. Perkins

Economists have focused considerable attention on the issue of "competitiveness" in recent years. In economics, competitiveness refers to an ability to achieve a market share. It is a relative, rather than an absolute, concept. You are competitive if you attain a market share. You are more competitive if your share is increasing (because a competitor's share must decline); you are less competitive if your share is decreasing. It is usual to expect that market share to be achieved by selling the commodity at a profit. Thus, we can adopt the Harvard Business School's definition of competitiveness: "National competitiveness refers to a country's ability to create, produce, distribute and/or service products in international trade while earning rising returns on its resources."

From this definition, we can proceed to develop measures of performance that will help define components of competitiveness. It is important to examine multiple performance measures over a long time to ensure these measures are related to broad social objectives. It is well recognized in the literature that economic measurements have inherent problems. Because concepts are rarely completely objective, some value judgments pervade these measures. Theory does not provide unambiguous measures of economic performance, nor does it provide for unambiguous interpretation of those measures. Measurement is a particularly serious problem across countries.

Because competitiveness is a relative concept, we need a measurement framework that permits us to systematically evaluate comparable factors thought to be relevant (or that explain relative positions in the market) at all levels of economic activity (that is, along the marketing chain). We have defined the outcome of competitiveness as "profitable trade," so it is appropriate to begin at the trade-sector level and to work backwards through the marketing and distribution process to the production level.

We will focus on the following levels of economic activity:

- Trade--the relative position of a country in activities relevant to trade, especially relative to competing countries;
- Macroeconomic--the relative economic position of an industry/sector in relation to the rest of the domestic economic; and
- Microeconomic--the comparative position of a country's industry in relation to similar industries in other countries.

In selecting meaningful measures, economists find it convenient to hypothesize that competitiveness is defined by market share and then to develop simple functions explaining that market share. In principle, researchers can do so at any of these levels of economic activity.

Trade Performance

Trade performance can be measured by: (1) the trade balance (merchandise trade, volume, and value), (2) the goods and services balance, and (3) the current account (balance of all international transactions).

These balance measures are ex post facto indicators of past performance and do not reveal whether trade is profitable or whether it contributes to rising real incomes. These balance measures do, however, provide the first base for intercountry comparisons.

In addition, one can create some meaningful ratios related to market share analysis. The following measures, including Balassa's index of revealed comparative advantage (RCA 1), generate useful information.

1. RCA 1, or commodity export share, is the ratio of a country's export share of world trade in a specific commodity (k) compared with its overall contribution to world trade. That is:

   $$\frac{Xik/Xi}{X_k/X}$$

   with 1 showing a revealed comparative advantage for country Xi in commodity k.

2. RCA 2, or sector trade balance share, is the ratio of a country's sectoral trade balance, or its export share of world trade in commodity group k (Xik/Xk) compared with its import share (Mik/Mk). That is:

   $$\frac{Xik/Xk}{Mik/Mk}$$

   with 1 revealing an export trade advantage for that sector in commodity group k.

3. RCA 3, or export share, is the ratio of a country's domestic output (Yi) that is exported (Xi) compared with its contribution to overall world output. That is:

   $$\frac{Xi/Yi}{Yi/Y}$$

4. CMSR, or comparative market share residual, isolates from the above measures the aggregate influence of trends or cycles by use of simple regression trends.

Vollrath developed an interesting index called revealed competitive advantage (RCA). It is a comprehensive composite ratio with broad applications. It includes both relative export shares (revealed comparative supply (RCS)) and relative import shares (revealed comparative demand (RCD)). Revealed competitive advantage is defined as the difference between RCS and RCD. That is:

$$RCA = RCS - RCD = \frac{Xik/Xi}{Xk/X} - \frac{Mik/Mi}{Mk/M}$$

A positive coefficient demonstrates that country i has a competitive edge in producing and trading commodity i.

Other potential measures include terms of trade, adaptations of exchange rate indexes, excess supply functions and their associated elasticities, relative efficiency and productivity measures, and producer and consumer equivalent subsidy adjustments.

Macroeconomic Measures

Many statistical indexes and ratios can be adopted to measure the relative economic performance of an industry within an economy. The principle is to examine a few key indicators that might explain why the industry performs as it does relative to the rest of the economy. The key macroeconomic indicators are: (1) growth rate relative to the overall business cycle; (2) employment/utilization of capacity; (3) productivity of principal factors, (4) relative profitability, or internal rates of return; and (5) domestic terms of trade.

Microeconomic Measures

It is traditional to utilize the comparative advantage measures of trade performance for cross-country comparisons of particular industries' performance outside their domestic borders. These are essentially the "least-cost/most efficient" producer measures. One needs to analyze these measurements in a comprehensive marketing chain framework to assess relative competitive performance fully.

The key microeconomic indicators are: (1) input/output measures at the basic production level, (2) comparative returns to principal resources (land), (3) productivity of principal resources, (4) value added in marketing and distribution, (5) locational consideration, and (6) infrastructure investment and gross margins.

Conclusions

Some of the most difficult aspects of economics are dealing with ambiguity in the measures of economic activity and interpreting inconclusive or paradoxical information.

In the context of economic competitiveness in trade, the prime measure of performance is market share. However, to provide insight into the economic features explaining that market share (degree of competitiveness), we need to develop a set of multiple measures and examine them over a long period.

To do so, we need an organized framework that lends itself to a systematic analysis of key measures at three distinct levels of economic activity: (1) the international trade performance level, (2) intersector macroeconomic performance linkages, and (3) microeconomic sector comparisons across countries.

The difficulty of making cross-country comparisons is underscored by the problem of interpreting exchange rate indexes. In the context of competitiveness, one should recognize the need to account not just for traditional demand influences (trade weighted, real purchasing power adjustments) but also for competitive influences of these effects among competitor countries.

REVEALED COMPETITIVE ADVANTAGE FOR WHEAT

Thomas Vollrath

We are examining the changing nature of competitiveness and noncompetitiveness in the world wheat market. Twenty-five countries receive special attention; 20 had the largest 1980-84 value of net wheat and wheat flour imports, and 5 had the largest 1980-84 value of net wheat and wheat flour exports.

In this study, I introduce a new indicator of competitiveness that entails using both commodity and country relatives. This concept, revealed competitive advantage (RCA), is defined as the difference of the relative export share of a good or service from its relative import share:

$$RCA_{i,wh} = RCS_{i,wh} - RCD_{i,wh}$$

where: $$RCS_{i,wh} = [(X_{i,wh}/X_{i,gs}) \div (X_{w,wh}/X_{w,gs})] \text{ and}$$

$$RCD_{i,wh} = [(M_{i,wh}/M_{i,gs}) \div (M_{w,wh}/M_{w,gs})]$$

$RCS_{i,wh}$ refers to country i's revealed comparative supply (RCS) for wheat, with X relating to export value and with w and gs equating to the world and to goods and services, respectively. $RCD_{i,wh}$ refers to revealed comparative demand (RCD), with M meaning import value. The difference between $RCS_{i,wh}$ and $RCD_{i,wh}$ measures net relative trade shares and is called revealed competitive advantage, $RCA_{i,wh}$. A coefficient greater than zero indicates a competitive advantage for wheat; a coefficient less than zero indicates a competitive disadvantage.

In the absence of relative distortions, RCA measures would be consistent with the economic principle of comparative advantage. Embedded in both the theoretical concept and the quantitative indicator are two comparisons: one between two trading entities (that is, one country and the world) and the other between two commodities (that is, one commodity and all goods and services). It is important to bear in mind that neither concept relates to absolute advantage.

RCA coefficients are determined largely by economic factors, such as resource endowments, technology, and income that underlie the concept of comparative advantage. They are also affected by policy-induced price distortions that prevent actual trade flows from reflecting the real pattern of comparative advantage. Expost facto measures of RCA summarize how a country or region has performed in commodity trade based not only on the relative determinants underscoring actual comparative advantage but also on the impact of both national and trade policies. RCA's are, therefore, better indicators of competitiveness than of the economic notion of comparative advantage.

Every country has a pattern of comparative competitiveness based on relative factor endowments and on the composition of relative foreign/domestic policies. However, a country can develop a positive RCA for a particular commodity that may eventually lead to the establishment of a real comparative advantage which did not previously exist.

The United States had a positive RCA for wheat and wheat flour throughout the 1961-84 period, demonstrating competitiveness of the U.S. wheat sector

compared with most other countries in the world and relative to other domestically produced commodities. In comparison with the four principal competitors for wheat and wheat flour, the United States generally maintained its relative competitive ranking throughout the 1961-84 period. The United States narrowed the competitive gap with Canada in 1964-74, but lost some ground to Australia and France in 1961-84 (fig. 1). Since 1973, Argentina has experienced the most rapid rate of growth in comparative competitiveness of all the principal wheat suppliers.

Examination of the RCA composition for total agriculture, wheat and wheat flour, coarse grains, and soybeans and groundnuts provides another perspective of revealed competitive advantage. In the United States, food grains, feed grains, and oilseeds are more competitive than is the agricultural sector as a whole (fig. 2). However, the wheat and wheat flour subsector is not performing so well as either the soybean and groundnut or the coarse grain subsectors. The oilseed subsector in the United States has historically outperformed the feed grain subsector. Baseline projections indicate, however, that the trade performance of coarse grains could outstrip oilseeds by 1990.

Finally, base estimates of the RCA for wheat were made to the year 2000. Linear regression coefficient weights were applied to independent projections of the eight components of wheat RCA. In addition to the base case, we identified two alternative scenarios for each exporting country, one involving a 20-percent increase in its projected exports of wheat and wheat flour for the year 2000 and the other involving a 20-percent decline. These changes were geometrically distributed throughout the projected period in order to present probable paths of adjustments between 1985 and 2000. Actual and projected RCA's for wheat and wheat flour for the United States and Canada are shown in figure 3.

Three-fourths of the significant importing countries display a growing competitive disadvantage for wheat throughout the remainder of this century, assuming no change from trend projections based upon 24 years of historical trade performance. This provides indirect evidence of continued increases in the specialization of world production and growth in the relative import demand for wheat.

Analysis of RCA trends suggest that the United States will face increasingly competitive pressures from other wheat-exporting countries. The wheat RCA ranking of all of the principal competitors, except France, are projected, in the base scenario, to exceed that of the United States in the year 2000. Moreover, the projected wheat competitive gap between the United States and France is shown to be narrowing.

Projected patterns for other agricultural commodities suggest that Australia, Canada, and France (unlike the United States and Argentina) will be comparatively more competitive in wheat than for coarse grains and oilseeds. Argentina will, however, continue to be the most competitive of all wheat producers based on a cardinal ranking of wheat RCA's. Yet, Argentina is likely to remain relatively more competitive in oilseeds and coarse grains than in wheat with export growth for soybeans being greater than for either food or feed grains--unless, of course, relative prices induce a different agricultural growth pattern.

Figure 1

Major wheat exporters: Revealed competitive advantages for wheat and wheat flour

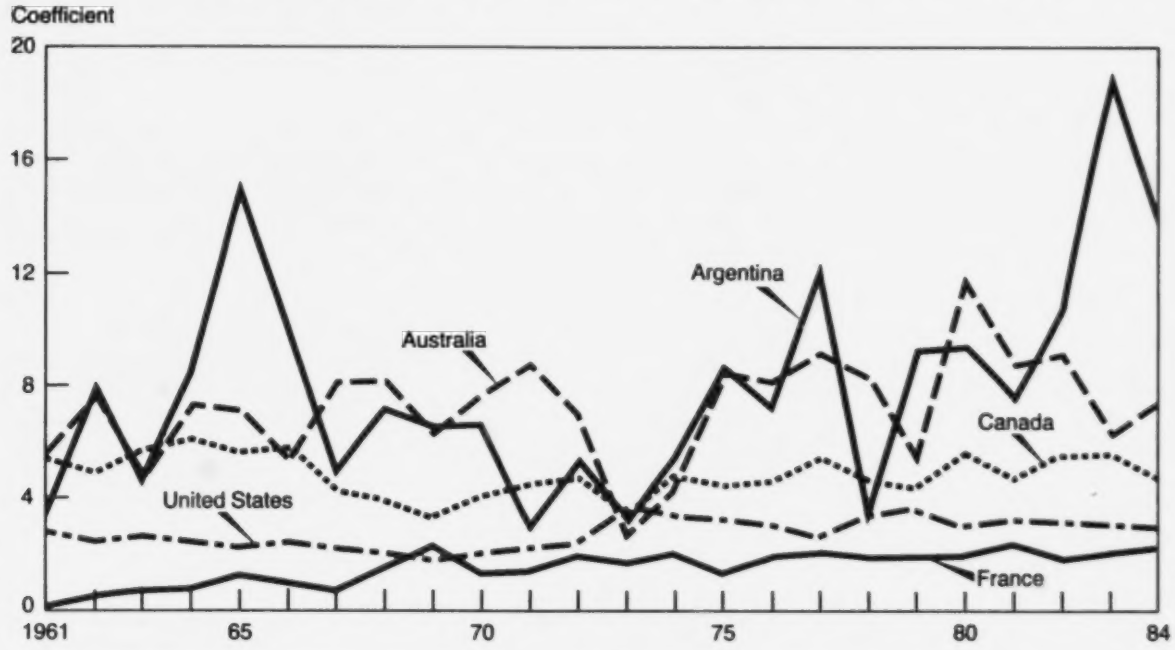


Figure 2

United States: Actual and projected revealed competitive advantages for selected commodities

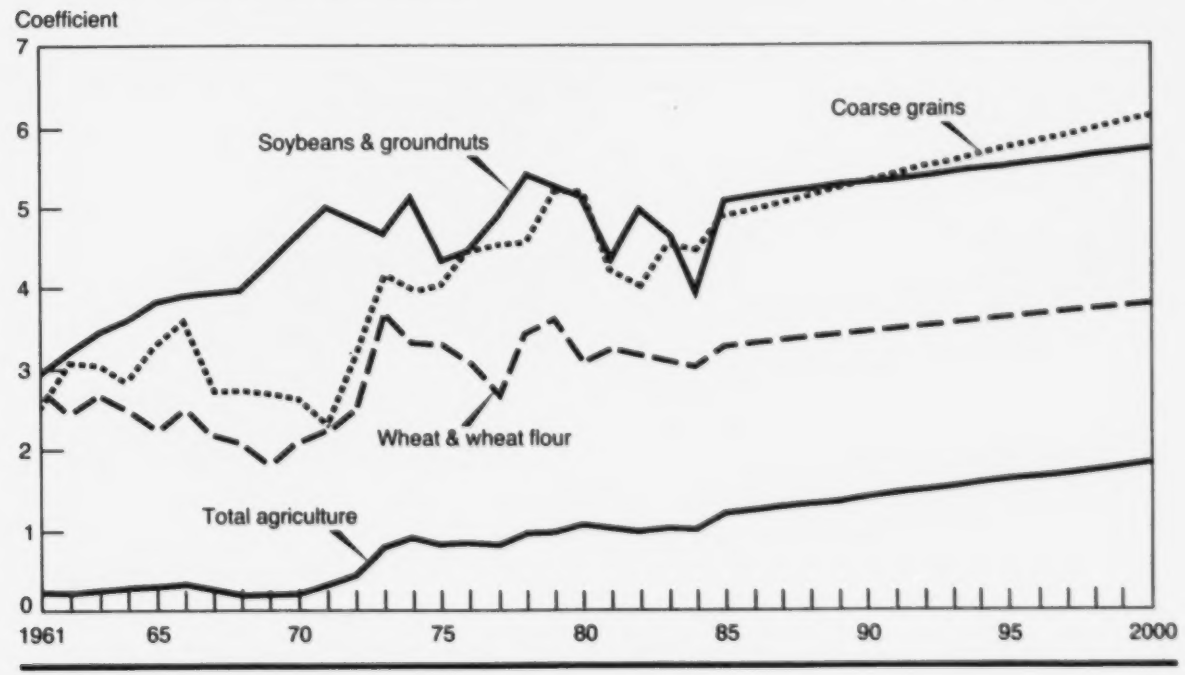
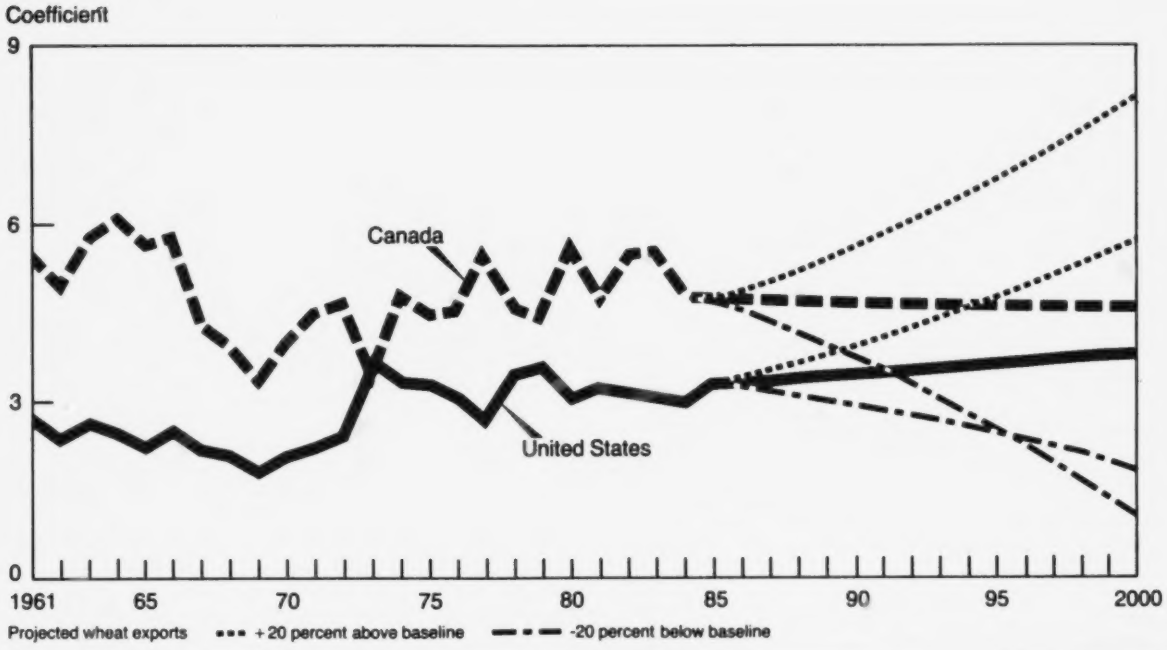


Figure 3

United States and Canada: Actual and projected revealed competitive advantages for wheat and wheat flour



POTENTIAL GROWTH IN THE WORLD WHEAT MARKET: THE IMPACT OF FACTORS UNDERLYING DEMAND

Mervin J. Yetley

The focus of this article is the per capita demand for wheat in nearly 100 countries and factors that underlie market demand. The link between wheat demand and U.S. competitiveness in the international wheat market, the focus of this conference, starts from the premise that it is easier to be competitive in any expanding market than in a declining market. To this end, information is presented on levels and rates of growth in per-capita wheat utilization. Special attention is given to categories of countries where the per-capita growth rate may be changing. Implications for future demand for wheat for five country groupings are discussed.

Wheat is a major food grain. It is thus appropriate to look closely at countries where wheat (or rice as the other preferred food grain) is the staple food in the average diet.

The consumption data are derived from Food Balance Sheet tapes of the Food and Agriculture Organization of the United Nations (FAO). These data are available for 1966-80 for over 100 countries. For some countries, data are available through 1983. However, the number of these countries with more recent data was insufficient for this study. The production data are derived from FAO Production Year Book tapes. These data are quite complete from 1961 through 1982.

The level of per-capita consumption of wheat is highest in country groups 1 and 2 (see table). Only in a few of these countries is there significant use of wheat for feed. Therefore, there are only limited opportunities for expanding per-capita wheat demand in these well-fed countries. Indeed, in group 2, the evidence suggests per-capita wheat consumption will decline in the future as is already occurring in group 1. Group 4, with four corn-consuming countries, appears not to be substantially expanding per-capita wheat consumption.

Groups 3 and 5, both with inadequate average diets, have the highest per-capita growth rates for wheat consumption. These two groups also have the lowest consumption levels. There is a large potential for expanding wheat markets in groups 3 and 5.

The emphasis of this study is on shifting dietary patterns. The upper income countries of group 2 shifted from food grains to meat and meat products. Assuming that pattern will be followed by other countries as their development proceeds, the question arises as to the impact of increased meat consumption on the demand for wheat as a feed grain.

First, it is worth noting that only a few developed countries now use wheat as livestock feed. In the vast majority of countries, livestock are fed grass or coarse grains. Unless this trend is reversed, increasing meat production to satisfy consumption will do little to increase the demand for wheat. Second, meat can be expected to substitute for wheat in the average diet of upper income countries.

Classification scheme for dietary levels

Staple food	Adequate	Inadequate
Meat and meat products	Group 1	XXX
Wheat and rice	Group 2	Group 3
"Other"	Group 4	Group 5

XXX = No countries with meat as the staple food had an inadequate diet.

The implication of increasing meat demand for coarse grains is the opposite of that for wheat. Following past trends and current livestock feeding practices worldwide, the demand for coarse grains can be expected to increase considerably.

There may be an indirect effect in some countries that will increase the demand for imported wheat. This increase may occur in countries that now produce some wheat for domestic consumption. The scenario could unfold as follows.

As the demand for meat increases, the demand for coarse grains will increase. If a country has a comparative economic advantage in the production of coarse grains but not wheat, domestic producers will shift land from wheat to coarse grains. This shift will likely increase demand for imported wheat to support established consumption patterns.

The major point to be made is simply this. The demand for wheat is derived from dietary needs and consumption patterns. Because the physiological need for food is finite, the demand for wheat cannot be projected apart from the demand for other foods.

The question of the extent to which U.S. food aid contributes to increased per-capita wheat consumption in food-aid-recipient countries is important for commercial wheat export markets in the near future. Data from the ERS report on 1985 World Food Needs and Availabilities (FNA) provided helpful information. This report tracks the concessional food needs in 69 developing countries. Virtually all these countries fall within groups 3 and 5 of this study.

The total consumption of grains, roots, and tubers, in grain equivalents, was used to form the following ratio for 1985:

$$\frac{\text{total assessed needs in grain equivalents}}{\text{total grain equivalent consumption}} = 0.026$$

The aggregate assessed needs have been met in recent years. Because the United States contributes approximately half the total assessed needs of these countries, P.L. 480 shipments support approximately 1.3 percent of the total cereal-equivalent consumption.

But per-capita food production, as measured in calories, has declined in 38 of the 69 countries appearing in the FNA report. Thus, in those countries with declining per capita production, P.L. 480 (which is primarily wheat) is quite likely responsible for the increasing per-capita wheat consumption. The P.L. 480 wheat is being used to prevent the fall (that is, fill the gap) in caloric intake of the population caused by inadequate domestic production.

The role of P.L. 480 is less clear for those countries where domestic per-capita food production and consumption have been increasing. Food aid shipments could be targeted to a specific group and never move into the marketplace. In this instance, the entire increase in consumption by the targeted group is supported by food aid. The extent to which P.L. 480 is directly responsible for observed increases in per-capita wheat consumption is much less obvious when increasing domestic production and rising commercial and concessional imports are involved.

PART III

MAJOR FACTORS AFFECTING SUPPLY, DEMAND, AND TRADE ON WORLD WHEAT MARKETS

FORCES THAT COULD EXPAND U.S. WHEAT EXPORTS: ESTIMATES FROM A WORLD WHEAT TRADE MODEL

Jerry A. Sharples and Praveen Dixit

We examine three forces that could expand U.S. wheat exports: (1) a lower wheat price support, (2) liberalization of wheat trade by the European Community (EC), Japan, and the United States, and (3) devaluation of the U.S. dollar. Estimates of the possible export response to each of these forces are obtained from a set of three experiments that use a static, spatial equilibrium, world wheat trade model. We made many assumptions to reduce the complex world wheat trade to a rather simple model. The model results indicate changes in U.S. wheat exports that might be associated with each of the three forces.

The model is designed to represent the 1984/85 world wheat market. We pose the following type of question: What would have happened under 1984/85 conditions if a specific change had been made? The answer is obtained from a comparison of two solutions of the model: the base solution, which describes actual wheat trade in 1984/85 as closely as possible, and an alternative solution obtained after the data in the model are modified to represent the change being analyzed.

The first experiment examines the impact on global trade of a drop in the U.S loan rate. The emphasis is on how the rest of the world would adjust trade to a 25-percent decrease in the U.S. export price of wheat. Major assumptions behind this analysis are: (1) a 25-percent drop in the loan rate (as occurred between 1985 and 1986) leads to a 25-percent drop in both the U.S. export price and the world price level; (2) the United States can expand exports to meet global needs at the lower price by depleting stocks or by diverting less land from production; and (3) other countries do not change their policies in retaliation.

Results suggest that, after about 3 years of adjustment, the lower U.S. loan rate and associated lower world price level would enable U.S. wheat exports to expand about 37 percent. Thus, the price elasticity of demand for U.S. wheat exports is about -1.1 over a 3-year period of adjustment. Global wheat imports would increase 7 percent with the additional amount purchased mainly by the USSR, China and the rest of Asia, and Central Africa. Wheat exports by Argentina, Australia, and Canada would decrease 15 percent, whereas EC exports would not change.

In the second experiment, Japan, the United States, and the EC-10 are assumed to completely eliminate the trade distortions in their domestic and trade policies for wheat. This experiment is difficult to handle with a single-commodity model because the results depend on policy changes in other commodities and in other countries. The results for wheat, however, provide a rough approximation of the world trade situation without domestic protection for wheat in these three major areas.

Japan would modestly increase imports (by 8 percent), but the EC-10 would greatly decrease exports (by 90 percent). The United States would increase exports by 30 percent. The additional U.S. exports would come from added production from land normally idled by Government wheat programs. These shifts among exporters would be nearly offsetting. Total world wheat trade would change little, and world wheat prices would increase only about 5 percent. Thus, there would be very little impact on other countries. Analysis shows that these results are extremely sensitive to the elasticities of supply and demand used for the EC-10.

The third set of experiments examines the impact of a devaluation of the U.S. dollar on wheat trade. First, a uniform 10-percent devaluation relative to all other currencies is examined. After the world had about 3 years to adjust to the devaluation, U.S. wheat exports would increase 5-6 percent.

Last, the actual change in exchange rates of various currencies relative to the dollar from March 1985 to February 1986 was introduced into the model. This period was one of substantial devaluation of the dollar relative to European and Japanese currencies. However, U.S. wheat exports would increase less than 1 percent in response to these adjustments in exchange rates. This estimate of a small shift in exports is due to the following factors: (1) countries such as Japan and the EC-10 (whose currencies significantly depreciated relative to the dollar) do not adjust wheat trade to world price changes; (2) USSR and China, both large importers, had no change in exchange rates; and (3) other exporters had little real change in exchange rates relative to the U.S. dollar. This last experiment shows the importance of identifying where the dollar is changing in value, country by country. Aggregate indexes of the value of the dollar can give a misleading indication of expected trade impacts.

These results are first approximations using a simple single-commodity model. We could improve the reliability of the results by using a two- or three- or n-commodity model that dealt with the close substitution between wheat and other commodities in both production and consumption. Furthermore, these issues are not unique to wheat; they simultaneously affect many commodities. Research is needed to build one or more multicommodity trade models that can adequately handle commodity interaction while remaining relatively simple and easy to use.

SHORTRUN IMPACT OF U.S. MACROECONOMIC POLICY ON THE U.S. WHEAT MARKET

Mark Denbaly

Unstable U.S. macroeconomic policy is believed to be at least as responsible as farm policy in determining the real and nominal agricultural export and price variables. In many of the related studies, however, exchange rates represent the only mechanism of transmission. Using the neo-Keynesian paradigm, this study uses theory to assess the shortrun, overall impact of expansionary macroeconomic policy on the U.S. wheat market, via its effect on total output, the general price level, and the real interest and exchange rates. The analysis concludes that expansionary monetary policy benefits both wheat producers and the public, whereas fiscal expansion does not.

Methodology

Changes in U.S. macroeconomic policy affect U.S. wheat prices and exports as well as the public wheat program expenses through their influence on the world wheat export supply and import demand. The effects are carried through linkages that total output, the general price level, and the real interest and exchange rates (henceforth referred to as the linkage variables) establish between the wheat market and macroeconomic policy. To examine the overall impact, a wheat model is first constructed graphically to (1) depict various domestic and international macroeconomic linkages and (2) account for the influences of U.S. wheat policy. Thus, the shortrun responses of the linkage variables to expansionary U.S. monetary and fiscal policies, as described by neo-Keynesians, are recursively fed through the wheat model to assess their impacts. Restrictive policies are assumed to have the opposite effects.

The world export supply, derived under the assumption that the world wheat market structure is oligopolistically competitive, consists of the export supplies of the United States and the other wheat exporting nations. Under such conditions, small exporters are able to sell their supplies at prices that are slightly below the U.S. price. In other words, buyers would first purchase from the cheaper sources and then turn to the United States to purchase their remaining needs. The structual assumption, therefore, implies that shortrun changes in U.S. macroeconomic policy affect the world export supply through its impact on the U.S. export supply. This is specified as the difference between the U.S. domestic supply and demand.

The U.S. domestic supply, controlled by wheat producers and Commodity Credit Corporation (CCC) stock release policy, is linked in the short run to U.S. macroeconomic policy through the effects of real interest rates on the behavior of wheat producers. Since wheat production is predetermined for a given marketing year, producers' decisions in the short run are reduced to how much of their available wheat is for market and how much of it is for carryover to the next period. On the other hand, U.S. domestic demand, obtained by aggregating over the final, the intermediate, and the CCC stock acquisition demands, is linked to U.S. macroeconomic policy through the real wheat price, future wheat price expectations, and total output. Together, responses of the U.S. domestic supply and demand to a change in U.S. macroeconomic policy yield the effects on the United States and, thus, the world export supplies.

The world import demand, determined by foreign real wheat price and income, responds to changes in U.S. macroeconomic policy via U.S. real wheat price and exchange rates. Coupling the effects of U.S. macroeconomic policy on the world export supply and import demand, then, reveals the overall impact on the volume, share, and price of U.S. wheat exports as well as the impact on the U.S. Government wheat program expenses.

Overall Impacts

Monetary and fiscal policies have different impacts on the U.S. wheat market because they affect the linkage variables differently. Consider first the impact of monetary expansion. Following the neo-Keynesian paradigm, in the short run, total output and the general price level rise while the real interest rate and exchange rate (value of the dollar) decline. The higher total output and general price level increase the domestic wheat demand; and the lower opportunity cost of holding stocks associated with the lower real interest rate increases producers' willingness to hold more stocks and, hence, to reduce the marketed supply. Consequently, the U.S. and the world export supplies fall at the initial wheat price. On the other hand, the world import demand responds positively to the decline in the real value of the dollar.

In general, monetary expansion increases revenues of wheat producers and reduces taxpayer spending for price support programs. For example, consider the case where the equilibrium wheat price is initially low, say at the loan rate when the import demand is relatively depressed. Monetary expansion increases the U.S. domestic supply (final, intermediate, and producers' inventory) and the world import demand while it reduces the export supply at the loan rate. The resulting excess demand raises the wheat market price above the loan rate, thereby eliminating the need for the Government to acquire more stocks to support the price level. Consequently, the quantity of wheat absorbed domestically and internationally increases at a higher-than-the-loan-rate price. Producers benefit from the higher wheat price, volume, and share of U.S. exports. For initial equilibrium prices above the CCC release price (that is, in periods of high import demand and low levels of private inventory), monetary expansion again increases the wheat price, but results in lower volume and share of U.S. exports. Producers still benefit as the drop in the export volume is compensated by higher levels of domestic consumption and price. For initial equilibrium prices above the loan rate and smaller than or equal to the release price (that is, for midrange levels of the import demand), the wheat price, volume, and the share of U.S. exports increase. In this case, possible reduction in the existing level of the Government stocks (by releasing them to the market) could result in lower wheat program expenses.

Under the expansionary fiscal policy scenario, the domestic wheat demand is affected similarly as both total output and the general price level increase in the short run. The difference lies in the varying domestic supply and import demand responses. Higher real interest rates increase producers' willingness to market their available wheat. Consequently, for any given level of the wheat price, supplies increase both domestically and internationally. On the other hand, the real appreciation of the dollar depresses import demand. Regardless of the initial level of the equilibrium price, the resulting excess supply associated with the fiscal expansion reduces the volume, share, and the price of U.S. wheat exports. When the market price tends to fall below the loan rate, the Government increases its

inventory demand to support the price, further increasing its outlays. For initial equilibrium prices above the CCC release price, fiscal expansion may eliminate the Government's opportunity to reduce program expenses by releasing its wheat stocks to the world market.

Suggestions for Further Research

The full impact, however, should also include the effects of foreign macroeconomic-policy reactions to changes in U.S. policies; a factor that was implicitly assumed to be exogenous in this study. In addition, monetary and fiscal policies are not conducted separately. Therefore, the effects of mixed policies need further investigation. Finally, the analytical structure of this study is based on a static and shortrun framework. To be complete, the analysis should take on a dynamic approach and introduce the time variable, even in the short run. For example, differing price and production dynamics of various sectors may render macroeconomic policy nonneutral in the short run. That is, when monetary policy is expansionary (contractionary), relative agricultural prices could rise above (fall below) their longrun equilibrium values, whereas the nominal interest rate and the foreign currency value of the dollar could fall below (rise above) their longrun equilibrium values. Further research is needed to properly explain the resource allocation and the price and production implications of such divergences both in the short and the long run and in an open economy setting.

THE VALUE OF THE DOLLAR AND COMPETITIVENESS OF U.S. WHEAT EXPORTS

Stephen L. Haley and Barry Krissoff

From 1981 to 1985, the value of wheat exports fell 44 percent and the U.S. market share fell from 46 percent to 29 percent. From 1970 to 1985, the value of the dollar adjusted for inflation increased dramatically, 43 percent against a weighted average of export-competitor currencies and 46 percent against a weighted average of wheat-importer currencies.

We hypothesize that changes in the value of the dollar affect U.S. wheat exports primarily through their effect on the international price of wheat. We address four specific questions. First, what are the relevant parameters for analyzing the effect of changes in the value of the dollar on U.S. wheat exports? Second, how long does it take for changes in the value of the dollar to affect wheat export levels? Third, what is the quantitative effect of a specified exchange rate change on wheat exports? Fourth, how important are changes in the value of the dollar to wheat exports relative to changes in target prices, loan rates, and foreign income?

To isolate the hypothesized relationships between the value of the dollar and wheat exports, we examine two distinct exchange rate measures: one weighted by export competitors and the other weighted by U.S. wheat importers. Changes in the export-competitor exchange rate are shown to inversely affect the world price of wheat in proportion to the price responsiveness of foreign export supply and a foreign nation's share of total wheat exports. Changes in the importer exchange rate are shown to inversely affect the price in proportion to the price responsiveness of import demand. Changes in price affect U.S. wheat exports in proportion to the price responsiveness of domestic supply and stockholding, adjusted for initial levels of current production and stocks.

Based on historical relationships established in the 1973-85 period, changes in the value of the dollar affect wheat exports over an 11-quarter time period. An exchange rate depreciation (appreciation) is not followed by an expansion (contraction) in wheat export volume until 1.5 years after the initial exchange rate change. The cumulative effect of a 1-percent depreciation (appreciation) in the value of the dollar is to expand (contract) U.S. wheat exports in the range of 1.9-3.0 percent (mean equals 2.4 percent). Over the sample period, there is evidence that changes in the real value of target and support prices have been more important than exchange rate changes in accounting for changes in wheat export levels. Likewise, exchange rate changes have been more important than foreign income levels in accounting for changes in wheat export levels.

According to the theoretical discourse and empirical results presented in our study, changes in the value of the dollar affect the price of wheat. In turn, a change in the price of wheat affects the return of those factors that are specific to wheat production. Over time, an increase can be expected to draw a nation's resources into wheat production, given suitable resource conditions. Additional research is needed to establish the relationships among the exchange rate, the world price of wheat, and the return to investment in wheat production. We hope this research will link competitiveness in the world wheat market to that branch of comparative advantage theory which accounts for trade patterns as a function of factor endowments.

PROTECTION AND LIBERALIZATION IN WORLD WHEAT MARKETS

Nicole Ballenger and Cathy Jabara

Agriculture is generally considered one of the most highly protected sectors of the global economy. A survey of agricultural trade policies indicates that use of nontariff barriers, such as variable levies and quotas by importers, and export subsidies by exporters are particularly common in wheat trade (2).1/ A number of studies indicate that government intervention in wheat and other agricultural markets has artificially depressed world wheat prices and may have adversely affected wheat export earnings for the United States (1, 4, 5, 6). However, model results depend heavily on the model framework, the base year of the analysis, and the design of trade liberalization scenarios.

As U.S. wheat exports and export shares have fallen, U.S. industry representatives and policymakers have become more concerned about the level and extent of protectionism and its impact on world and U.S. agricultural exports. This concern is reflected in the numerous complaints of unfair trading practices filed by U.S. agricultural producer groups and brought before the General Agreement on Tariffs and Trade (GATT) panels, as well as by the export expansion provisions of the 1985 Farm Security Act. Concern about protectionism has also spurred the call from the U.S. Government for a new round of multilateral trade negotiations (MTN) to be conducted under GATT auspices. Other GATT members, many of whom are also concerned about agricultural protectionism, have agreed to convene a new MTN, which began in September 1986. A major objective is to bring agriculture more fully into the GATT framework by strengthening the loose and poorly defined agricultural trading rules, particularly those that pertain to using subsidies and nontariff barriers.

Our major objectives here are: (1) to relate developments in world wheat markets since the seventies to protection and liberalization and (2) to relate the forms of government intervention in wheat markets to the prospects for trade negotiations.

We first examine some developments in world wheat markets using market penetration ratios and growth rates (3). The market penetration ratio shows the percentage of domestic consumption supplied by imports; a positive market penetration growth rate implies that imports are increasing at a faster rate than domestic production. When market penetration ratios and growth rates for wheat are compared with those for other commodities, we have a means of rating wheat export performance.

- Market penetration by all exporters increased at a slower rate for wheat than for other commodities (except rice and cotton) in the seventies. Although the market penetration rate is not a measure of protection, these results lend support to the notion that wheat is relatively more highly protected.

- Market penetration growth rates for wheat were negative in Asia (as a whole) and in Western Europe, even during the period of rapid wheat export growth in the seventies. This negative growth rate suggests that these regions are relatively more highly protected; in fact, nominal

1/ Underscored numbers in parentheses refer to items in the references at the end of this article.

rates of protection are very high in Japan and the European Community (EC). However, in Asia, a successful Green Revolution also contributed to the low penetration growth rates. Note that, although protection of wheat has been quite high in South Korea, market penetration has increased quite significantly, principally because of the even higher rate of protection for rice!

- During the seventies, the United States generally fared well in world commodity markets compared with its competitors. However, it fared relatively less well in wheat. One reason appears to be U.S. dependence on Asian markets where import penetration was declining. In 1980-82, 43 percent of U.S. wheat exports went to Asia, compared with 29 percent for all other wheat exporters. This suggests that, in addition to trade liberalization, the United States should pursue market diversification, as its competitors have done.

- In some highly protected markets, such as Japan and Taiwan, the United States already has very high market penetration ratios: 92 and 99 percent, respectively. There is, therefore, probably little to gain from trade liberalization in these markets.

- The EC is the area where protection of wheat has had a profound impact on its role in world wheat trade. The key questions with respect to wheat trade liberalization may well be: Would the EC stop exporting wheat? How would the United States fare compared with its competitors in recapturing EC export markets? Can the United States and the EC agree on GATT rules guiding agriculture?

Finally, we note that the USSR, China, and other centrally planned economies, which are not GATT members, account for about 50 percent of world wheat imports. Therefore, multilateral trade negotiations directly affect about half the world wheat trade.

In the second section, we look across countries at the nature and extent of government intervention in wheat trade, and we try to draw some conclusions for trade negotiations. The countries included in the survey accounted for 68 percent of world wheat imports and for 94 percent of exports in 1983-85. They accounted for approximately 86 percent of world wheat production in the same period.

Nontariff trade barriers affect 99 percent of the wheat imports covered by the survey (table 1). In producing countries, these barriers are clearly linked to some form of government intervention in domestic prices (table 2). Only two countries in the sample rely only on tariffs to regulate wheat trade. State trading is the most common form of nontariff barrier, followed by quotas, either explicit or implicit via some form of licensing scheme. Two major importers, the EC and Chile, rely on a variable-levy system.

Nontariff barriers raise special problems for trade negotiations and for trade liberalization analyses:

- They are "nontransparent." In other words, the level of protection cannot be easily ascertained. Protection with price-support systems and nontariff barriers can actually be negative, such as in the case of protection of Mexican wheat in many years.

Table 1--Percentage of world wheat imports and production affected by nontariff barriers, 1983/84-1984/85

Importing country	World market share		Nontariff barrier 1/			
	Imports	Production	Variable levies 2/	Licensing and/or quotas 3/	State trading	Tariffs
	Percent					
Organization for Economic Cooperation and Development:						
Japan	6.1	--		*	*	
EC	3.1	14.0	*			
New Zealand	.1	--			*	
Portugal	.7	--			*	
Spain	.1	--		*	*	*
Total	10.1	15.0				
Newly industrialized countries:						
Brazil	4.9	--			*	
Chile	.9	--	*			
India	1.4	9.0			*	
Malaysia	.7	0				*
Mexico	.6	--		*	*	
Korea	2.9	--		*		*
Taiwan	.8	--		*		*
Total	12.2	1.0				
Less-developed countries:						
Egypt	7.0	--		*	*	
Indonesia	1.6	0			*	
Nigeria	1.8	--		*	*	
Thailand	.2	--				*
Total	10.6	1.0				
Centrally planned economies:						
Eastern Europe	3.4	7.5			*	
USSR	25.7	15.3		*	*	
China	6.4	17.0			*	
Total	35.5	39.8				
Cumulative total	68.4	66.8				

-- = Less than 0.5 percent of world production.

1/ Does not include antidumping duties or countervailing duties, sanitary regulations, technical standards, foreign exchange rationing, or bilateral agreement.

2/ Includes all measures for enforcement of decreed prices.

3/ Includes quantity restrictions, import permits/licenses, and prohibitions of imports.

Table 2--Percentage of world wheat imports and production affected by domestic price and income support programs, 1983/84-1984/85

Importing country	World market share		Producer income payments	Producer price controls	Producer input subsidies	Consumer food subsidies
	Imports	Production				
	Percent					
Organization for Economic Cooperation and Development:						
Japan	6.1	--	*	*	*	*
EEC	3.1	14.0		*		
New Zealand	.1	--		*	*1/	*1/
Portugal	.7	--	*	*	*	
Spain	.1	--		*	*	
Total	10.1	15.0				
Newly industrialized countries:						
Brazil	4.9	--		*	*	*
Chile	.9	--		*2/	*	*2/
India	1.4	9.0		*	*	*
Malaysia	.7	0				*
Mexico	.6	--		*	*	*
Korea	2.9	--			*	
Taiwan	.8	--		*	*	*
Total	12.2	11.0				
Less developed countries:						
Egypt	7.0	--		*	*	*
Indonesia	1.6	0				*
Nigeria	1.8	--		*	*	*
Thailand	.2	--				*
Total	10.6	1.0				
Centrally planned economies:						
Eastern Europe	3.4	7.5				
USSR	25.7	15.3				
China	6.4	17.0		*		*
Total	35.5	39.8				
Cumulative total	68.4	66.8				

-- Less than 0.5 percent of world production.

1/ These policies are being phased out.

2/ Maximum and minimum prices are maintained through the variable-levy system.

- Price-support systems and nontariff barriers often result in very low levels of world-to-domestic price transmission. Therefore, the level of protection may vary dramatically as world prices vary. This variance appears to have been true, for example, in Brazil and India. It also means that the base period chosen for trade liberalization studies must be scrutinized carefully.

- Nontariff barriers do not facilitate cross-commodity comparisons. In South Korea, for example, it is relative rates of protection that are important.

We conclude that an initial step in the agricultural trade liberalization process should be to begin moving toward a system of price support based on tariffs. This process has been possible in other sectors. Mexico is an example of a country beginning to replace its state trading and licensing system with tariffs as it prepares to join the GATT. So many variations on nontariff barriers greatly complicate negotiations aimed at reducing the level of protection in wheat and other agricultural commodities.

The use of nontariff barriers will hinder the process of reducing protection or limiting support. How can a 10-percent reduction in a variable levy be compared with a 10-percent reduction in support provided by a marketing agency? How can mutually acceptable levels of price support be agreed on when countries' cost structures and macroeconomic conditions, such as inflation rates, vary so greatly? Many of our existing studies of trade liberalization are based on model runs where protection is reduced by some percentage across the board. How do we interpret these runs? Are they any more feasible politically than complete trade liberalization?

The country policy data survey also indicates that:

- Wheat exporters, with the notable exception of Argentina, rely on some form of price- and/or income-support system and export expansion mechanism, such as subsidies or export credit guarantees (tables 3 and 4). The United States is the only exporter that has used a deficiency payment scheme to minimize the distortions between world and domestic prices. Deficiency payments are a transparent form of protection; they are less destabilizing to international markets than are other forms of protection; they would eliminate the need for export subsidies to dispose of surpluses; and, combined with some form of supply control, they need not depress world prices.

- Almost all developing countries have wheat subsidies for consumers. Depending on relative supply and demand elasticities, these subsidies may offset the trade effects of positive producer price supports. As indebted developing countries eliminate or reduce consumer subsidies, in the context of austerity programs, their wheat imports could decline.

This problem leads to a final point: it will be difficult enough for developed countries to agree on stronger GATT rules for agriculture, but developing country issues will also need special consideration. It is clearly not feasible for a country with foreign exchange constraints to rely solely on a tariff system, no matter how desirable. Ultimately, the choice of trade regime is related to macroeconomic factors beyond the realm of the GATT.

Over the next few months, as trade negotiations get started, we need to focus on quantifying nontariff barriers to trade, on identifying the forms of

government intervention with the most insidious trade effects, and on analyzing the impacts of changing the form of support provided agriculture as well as the overall level of support.

Table 3--Percentage of world wheat exports and production affected by nontariff barriers, 1983/84-1984/85

Exporting country	World market share		Export subsidies	Export taxes	Export quotas	State trading	Subsidized export credit
	Exports	Production					
	Percent						
Organization for Economic Cooperation and Development:							
United States	37.0	13.5	*				*
Australia	12.4	3.0				*	
Canada	19.8	4.5				*	*
EC	15.8	14.0	*				*
Total	85.0	35.0					
Newly industrialized countries:							
Argentina	8.5	2.0		*	*	*	
Cumulative total	93.5	37.0					

Table 4--Percentage of world wheat exports and production affected by domestic price and income support programs, 1983/84-1984/85

Exporting country	World market share		Producer income payments	Producer price supports	Production input subsidies	Consumer food subsidies
	Exports	Production				
	Percent					
Organization for Economic Cooperation and Development:						
United States	37.0	13.5	*	*		
Australia	12.4	3.0		*	*	
Canada	19.8	4.5	*	*	*	
EC	15.8	14.0		*		
Total	85.0	35.0				
Newly industrialized countries:						
Argentina	8.5	2.0			*	
Cumulative total	93.5	37.0				

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INTERNATIONAL TRANSPORTATION AND THE COMPETITIVENESS OF U.S. WHEAT EXPORTS

Kay L. McLennan

The cost of international shipping services is an important factor in determining the landed price of products in world markets and in influencing the profits received by exporters. Because freight rates fluctuate sharply, export competitiveness is influenced not only by the level of rates but also by the ability to manage freight rate volatility.

Shipping services add an average 15-30 percent to the price of U.S. agricultural exports. A comparison of U.S. exporters' average annual freight rates with rates paid by Canadian, Argentine, and Australian exporters shows U.S. rates are the lowest in trade with Europe and the USSR; highest for India, Japan, and the Philippines; and average for China. These comparisons reflect relative shipping distances as well as other factors affecting shipping, such as the availability of a backhaul, fuel costs, and port expenses.

The following shipping practices, used by all wheat traders, inhibit competitiveness:

- A reluctance to enter into long-term charter arrangements because of year-to-year variability in grain trade. Accordingly, the use of "spot" charters exposes shippers to volatile freight rates.
- A preponderance of small, inefficient vessels used in the grain trade.
- A phenomenon where ships carrying grain (compared with other dry bulk commodities) spend significantly more time in port loading and discharging.

The United States and Canada are relatively competitive in terms of port infrastructure. Both have adequate storage, modern loading equipment, and sufficient channel and berth depths to facilitate efficient international shipping arrangements. In contrast, Argentina and, to a lesser extent, Australia are disadvantaged in terms of port capabilities.

Although U.S. exporters can use larger, more efficient vessels, deficient port facilities in recipient countries significantly limit the use of these vessels.

An examination of the United States and its major competitors shows significant differences in assistance to the merchant marines. Some of these differences appear to influence the comparative freight rates.

Although Argentine exporters pay a premium because of long turnaround times in port, they are given refunds for using Argentine merchant vessels and are provided access to state-owned ships. In contrast, Australian and Canadian merchant fleets are the least supported. Current U.S. reservation practices only apply to Government-impelled cargoes, but several bills pending in Congress would extend the reservation to commercial cargoes. Because U.S. flag vessels are the least competitive, freight rates would rise if additional cargo reservation mandates are enacted. Those added costs would likely be passed on to foreign consumers and domestic producers, and U.S. exports would fall.

Conditions in the shipping market are bleak. More than a third of the world fleet is idle; freight rates are depressed. According to estimates by Lloyds' Shipping Economist, with scrapping at the previous 12-month level, excess shipping capacity is not expected to abate until 1990. On the positive side, low freight rates contribute to export market development, expansion, and competition. The current overcapacity has motivated many foreign governments to increase shipping protectionism. Protection of domestic shipping by the United States and by foreign governments is one of the most serious longrun threats to shipping efficiency.

Two new tools, if utilized, may contribute to more efficient export transportation. First, freight rate futures contracts can help bulk exporters hedge against the dramatic price movements that characterize the charter market. Second, transport-oriented export trading companies promote the cost savings associated with joint exporting ventures and avoid the typically large capital investments associated with this type of vertically integrated activity.

Finally, we incorporate four scenarios of changes in ocean freight rate charges into the World Wheat Trade Model (presented in Sharples and Dixit's wheat competitiveness paper entitled "Forces That Could Expand U.S. Wheat Exports"). The model's results revealed how changing transportation charges could affect worldwide wheat trade. Four scenarios follow.

1. Assuming Argentine and Australian exporters are able to decrease their ocean freight charges by 5 percent as a result of port and infrastructure improvements:

   - Worldwide grain trade would increase slightly; and
   - Argentine and Australian exporters would be able to increase their wheat exports slightly, whereas Canadian and U.S. exporters would decrease their exports slightly.

2. Assuming all exporting countries decrease their ocean freight charges by 5 percent as a result of port and infrastructure improvements in developing country importers:

   - Worldwide grain trade would increase; and
   - All exporters would increase their export volumes slightly; for example, U.S. exports would increase by 0.15 percent.

3. Assuming the ocean freight bill for U.S. exporters is reduced by 5 percent because U.S. exporters can hedge their ocean transport needs through dry bulk freight rate futures contracts:

   - The amount of wheat traded would increase;
   - U.S. wheat exports would increase by 0.3 percent; and
   - Canada, Argentina, and Australia would export less.

4. Assuming the ocean freight bill for U.S. wheat exports increases 10 percent as a result of the passage of a bill (currently pending in Congress) that would extend cargo reservations from Government-impelled cargoes to a portion of U.S. commercial exports:

   - o Overall worldwide grain trade would decrease;
   - o U.S. exports would decrease by 0 percent whereas trade volume of all other exporting countries would increase slightly; and
   - o U.S. f.o.b. price would drop $1 per ton, whereas the f.o.b. price would increase about $1 per ton for all other exporting countries.

Research Needs

The discussion of transportation and the competitiveness of U.S. wheat exports presented here merely introduces the potential transportation-related impediments facing agricultural exporters. Other research needed on international transportation and the competitiveness of dry bulk commodities includes:

1. Quantification of the costs of governmental support of merchant fleets and the implicit loss/gain of competitiveness attributable to various subsidies;
2. Impacts of port and inland waterway user fees on the landed costs of agricultural exports;
3. Use of floating silos and transloaders to augment deficient port and infrastructure capabilities in importing countries;
4. Quantification of the comparative port capabilities, for example, the maximum export capacity of U.S. and competitor ports;
5. Further analysis of the viability of freight futures contracts as hedging and forecasting tools;
6. Impacts of current depressed market conditions on the future availability and cost of dry bulk charter shipping services;
7. Further analysis of trends and costs related to the escalation of international shipping protectionism; and
8. Improved methodology for forecasting shipping rates.

ENHANCING THE INTERNATIONAL COMPETITIVENESS OF U.S. WHEAT THROUGH AGRICULTURAL RESEARCH

Ira D. Branson and Yao-chi Lu

This study examines emerging U.S. agricultural production and post-harvest technologies that may impove the future competitive position of U.S. wheat. Wheat research resource levels for the United States, Canada, Argentina, Australia, and France are presented that indicate the potential for maintaining trends in productivity. The data show that wheat yields in France are increasing at a substantially higher rate than those of other major exporters. However, if the United States maintains its current lead in biotechnology, the productivity of its wheat should improve relative to other major exporters.

U.S. Wheat Yields Will Increase, Possibly at a Slower Rate

A recent Office of Technology Assessment (OTA) study projected U.S. wheat yields to continue increasing, but at a slower rate than in the past several decades.1/ This projection reflects the visualized impact of emerging technologies on wheat yields as seen by a multidisciplinary team of biological, physical, and social scientists. Under the most likely OTA scenario, yield would increase 24 percent from 36 bushels per acre in 1982 to 45 bushels per acre in 2000. The projected annual compound growth of 1.2 percent is far less than the average annual rate of 1.6 percent in 1960-82. Wheat production costs would decline 20 percent per bushel under this scenario. ERS analysts project yields will reach 42 bushels per acre by 1990, a rate of increase greater than the OTA study. Historic U.S. wheat yields and these projections are shown in Table 1. The OTA projection did not consider yield impacts resulting from future acreage diversion programs, changing price ratios of production inputs, or changing net farm income.

Technological progress in U.S. wheat yields will continue with incremental improvements cutting across breeding, genetics, disease and pest control, tillage and harvesting methods, and management systems. Several major technological areas are expected to contribute to the yield trend and to reduce unit production costs: (1) new semi-dwarf varieties are being developed; (2) hybrid wheat with a 10-20 percent yield advantage may be more widely adopted if seed costs can be reduced; (3) reduced tillage systems continue to be adopted with lower per-unit production costs and soil conservation advantages; and (4) control of the "take-all" fungus disease in the Northwest should boost yields in that region.

Future breakthroughs in wheat production are likely to come from plant genetic engineering where the United States currently has a lead over competitors. These genetic engineering gains are not expected to improve wheat yields until about 2000, because the fundamental knowledge base in plant physiology and genetics must be developed to support the new biotechnology effort. Recent advances in information technology may also increase the efficiency of wheat production by helping farmers integrate more complete information into their decisions.

1/ U.S. Congress, Office of Technology Assessment, Technology, Public Policy, and Changing Structure of American Agriculture, OTA-285, March 1986.

Table 1--Average U.S. wheat yield, 1950-86, and projections to 1990 and 2000

Year	Yield
	Bushels/acre
1950-54	17.3
1955-59	22.3
1960-64	25.2
1965-69	27.5
1970-74	31.0
1975-79	31.4
1980-84	36.2
1985	37.5
1986	34.3
1990	42.1 (ERS projection)
2000	45.0 (OTA projection)

Table 2--Wheat yields for major exporting countries, 1970-85

Country	Average yield (16 years)	Annual change (T-statistic)
	Bushels/acre	
France	74.9	2.1 (5.8)
United States	35.4	.5 (4.0)
Argentina	25.7	.5 (3.4)
Australia	26.3	.2 (.9)
Canada	28.8	.1 (.7)

Numbers in parentheses are the T-values which indicate the statistical significance of the annual change in wheat yields.

Wheat yields in France, Argentina, and the United States increased in the 1970-85 period, with the yield in France increasing about four times faster than in Argentina and the United States (table 2). Canadian and Australian yields were virtually constant over this period. Canada has developed a 25- to 30-percent higher yielding semi-dwarf Spring wheat that is of lower quality than its standard varieties. Whether the Canadian Wheat Board licenses the production of this medium protein (10-12 percent), medium-soft kernel wheat remains to be seen.

Incremental Improvements Likely in Post-Harvest Marketing

In the post-harvest area, it is difficult to identify emerging technologies coming from publicly supported research that will dramatically alter the costs of processing, transporting, handling, storing, or otherwise marketing wheat. The most likely advancement is expected in the wheat milling and baking industries as they draw on available process technologies and computer capabilities developed here and abroad to modernize facilities and produce higher quality products at a lower cost. The changes proposed in U.S. grain grades and standards may also strengthen the U.S. position in international markets.

As baking becomes more automated, research must improve online sensing instruments capable of determining wheat protein level, protein quality, and milling characteristics for given end-use products. This instrumentation and the associated rapid tests are gradually being developed. This technology will help wheat breeders ensure that new varieties meet industry needs.

U.S. wheat quality has probably remained about the same in recent years. Although wheat protein quality has improved, the protein content per bushel has declined as yields increased. Some scientists are concerned that we may have reached a plateau in improving protein quality. If protein content continues to decrease, the overall quality of wheat may begin to decline.

U.S. wheats are sometimes criticized in international markets for containing excessive foreign matter or dockage. Progress is expected on this problem as the Federal Grain Inspection Service (FGIS) has published in the Federal Register provisions that change the standard for rounding the amount of dockage from the nearest 0.5 percent to the nearest 0.1 percent. This adjustment will reduce allowable dockage. Foreign buyers can now specify lower dockage levels in their contracts if they choose to and are willing to pay for them. However, the impact of this change on the U.S. competitive position may be less than some people anticipate.

Another wheat-marketing problem that technology should help resolve concerns visual wheat grades as historically determined. These visual grades have become increasingly unreliable in classifying wheat varieties. Scientists are crossbreeding different classes of wheat to improve yield and wheat quality. For example, the Arkan variety is a cross between Hard Red Winter and Soft Red Winter. Visually, it appears as a mixed wheat of lower value, but it has high-quality protein characteristics. Instrumentation is being developed to support more quantitative grading methods; however, practical systems are not yet implemented.

U.S. Wheat Research Investments Should Help Maintain U.S. Technological Position

We collected information on wheat research resources for the United States, Canada, Australia, and Argentina to indicate the future direction of research results. Comparable data were not available for France. However, changes in wheat productivity can be inferred from a review of total agricultural research.

U.S. wheat research funding in the publicly supported State-Federal system in the 1974-84 period increased from $15 million to $40 million in nominal

dollars (table 3).2/ In real dollars (1982 = 100), this change represented a 23-percent increase. The total number of scientist years (SY's) committed to wheat research during this period increased 8 percent from 268 to 290 SY's, so real funding per scientist also increased.

There were several important changes in the aggregate U.S. figures. The Agricultural Research Service reduced the number of SY's associated with wheat research from 137 to 90, a 44-percent decrease. This reduction was in post-harvest research programs concerned primarily with expanding the demand for wheat in domestic and international markets.

The State Agricultural Experiment Station (SAES) as a group increased total SY's associated with wheat by 50 percent, from 125 to 190 SY's. This increase was primarily in efforts to improve the biological efficiency of wheat and to control pests. A negative factor in the data was a slight decrease in real funding for SAES wheat scientists during 1979-85.

Table 3--Resources committed to wheat research: United States, Canada, Australia, and Argentina, 1979 and 1984

Item	Unit	1979	1984
United States (State/Federal system):			
Funding	Million dollars	15	40
Researchers	SY's 1/	268	290
Canada researchers	PY's 2/	110	97
Australia	Million U.S. dollars	5	9
Argentina: 3/			
Funding	Million U.S. dollars	7	NA
Researchers	SY's	128	NA

NA = Not available.

1/ SY's (scientist years).

2/ PY's (professional years).

3/ Based on a constructed time series of data contained in the footnote 5 reference; agricultural research expenditures in Argentina totaled $59.7 million (1980 U.S. dollars), and staff time totaled 1,965 scientist years. Using the ratio of wheat expenditures in 1976 to total agricultural research expenditures, we made 1980 estimates; they appear in the 1979 column as an approximation.

2/ U.S. Department of Agriculture, Cooperative State Research Service, Current Research Information System (CRIS), Beltsville, MD.

U.S. resource trends generally bode well for future research, particularly at the production level. However, the resource capability in the post-harvest research area may be inadequate, given the importance of expanding demand and improving wheat quality in international markets.

Data from the Inventory of Canadian Agri-Food Research (ICAR) show that the number of Canadian professional staff years associated with wheat research decreased from 110 to 97 during 1979-84, a 12-percent decrease.3/ This decrease is especially surprising because it came in plant biochemistry programs, an important component of biotechnology research. Funding levels are not reported in the ICAR inventory.

Wheat research funding in Australia increased from $2 million (Australian dollars) in 1974 to $8.6 million in 1984.4/ This figure represents a 56-percent increase in real terms (1979-80 = 100). However, because of changes in exchange rates, when this funding level is converted to equivalent U.S. dollars, it shows little or no growth.

The Argentine wheat research data presented here are estimates and should be viewed that way. Data published by Judd, Boyce, and Evenson show Argentine wheat research funding in 1972-76 at about $6.7 million (1980 U.S. dollars).5/ The data in table 3 are based on figures for all agricultural research funding and staff time in 1980, with a proration to wheat based on the 1976 ratio. These data show an estimated 1980 funding level for wheat research at $7 million (U.S.) and 128 research scientists.

We do not have wheat research funding levels for France. However, based on data from Judd, Boyce, and Evenson, total public French agricultural research expenditures have increased much faster than U.S. expenditures. It seems reasonable to assume that given the importance of wheat to the French agricultural economy, expenditures for wheat research increased as fast as total agricultural research expenditures. The expanded research is an important factor in explaining why French wheat yields have increased rapidly.

A broader view of public agricultural research funding around the world shows all regions increased expenditures for agricultural research faster than the United States did. China had the most rapid rate of increased funding in the 1959-80 period (table 4). In 1980, the EC (with $1.5 billion) led the United States (with $1.1 billion) in agricultural research expenditures (in constant 1980 U.S. dollars). The data in this table tend to explain why some countries have been able to successfully increase current agricultural output. The result has been a reduction in total world agricultural trade. Whether the industrialized nations can maintain their momentum in agricultural trade remains to be seen.6/

3/ Agriculture Canada Research Program Service, Inventory of Canadian Agri-Food Research (CARC), Ottawa. 1985.

4/ Australia Department of Primary Industry, Wheat Research Act 1957, Annual Report 1984-85 (Canberra: Australian Government Publishing Service, 1985), p. 10.

5/ Judd, Ann M., James K. Boyce, and Robert E. Evenson, Investing in Agricultural Supply. Economic Growth Center Distribution Paper 442 (New Haven, CT: Yale University Press, June 1983).

6/ Carter, Harold O., "A Hungry World: Lessons from a Land-Grant-School Perspective," American Journal of Agricultural Economics, Vol. 67, No. 5, Dec. 1985, p. 923.

Table 4--Public expenditures on agricultural research, by major world regions, 1959, 1970, and 1980

Region	Expenditures in constant U.S. 1980 dollars			Change, 1959-80
	1959	1970 1/	1980	
	-- Million dollars --			Percent
Asia, excluding Japan and China	72	205	470	653
Japan	135	498	684	507
China	54	503	644	1,193
European Community	275	919	1,489	541
Latin America	80	216	464	580
Canada, Australia, and New Zealand	196	486	628	320
USSR	373	846	939	252
Eastern Europe	196	436	553	282
Africa	119	252	425	357
United States	564	998	1,094	194
World total	2,064	5,359	7,390	358

1/ Average of 1968 and 1971.

Source: Carter, Harold O., "A Hungry World: Lessons from a Land-Grant-School Perspective," American Journal of Agricultural Economics," Vol. 67, No. 5, Dec. 1985, p. 923. We modified Carter's original table by rounding off decimals for expenditures and by dropping percentage figures for each region. These data were derived from appendix table 1 in Ann M. Judd, James K. Boyce, and Robert E. Evenson's Investing in Agricultural Supply, Economic Growth Center Distribution Paper 442 (New Haven, CT: Yale University Press, June 1983).

The U.S. research figures discussed here do not include private-sector agricultural research funding, which is greater than public-sector funding. The United States dominates in the area of biotechnology, in terms of the number of companies working in this area. Table 5 shows 73 U.S. companies in agricultural biotechnology compared with 15 in the United Kingdom and 12 in Japan.7/ The United States, Japan, and the EC have about the same number of companies in food biotechnology.

Conclusion

Heavy funding in wheat science and technology programs does not guarantee competitiveness in international markets in the short run. Current commodity and trade policies can and do offset the impacts of technological progress. However, failure to maintain a strong technological base can reduce

7/ Dibner, Mark D., "Biotechnology in Europe," Science, Vol. 232, June 13, 1986, p. 1368.

Table 5--Companies involved in specific areas of biotechnology, selected countries 1/

Biotechnology areas	France	Italy	West Germany	United Kingdom	United States	Japan
			Number of companies			
Agriculture	5	1	2	15	73	12
Antibiotics	1	2	4	1	4	8
Chemicals	1	--	1	4	37	31
Diagnostics	3	5	6	10	141	15
Fermentation	3	--	--	6	21	13
Food	2	--	1	12	18	17
Hybridomas	2	4	4	4	50	13
Pharmaceuticals	2	5	4	5	28	28
Total	31	16	18	79	319	161

1/ The data in this table indicate the approximate number of companies working in the specific areas of biotechnology. Companies may be involved in more than one type of biotechnology, therefore the sum of companies for the listed areas may be greater than the totals. Also, the table does not list all biotechnology areas so in several cases the sum of the companies for the cited areas does not add to the totals.

Source: Dibner, Mark D., "Biotechnology in Europe," Science, Vol. 232, June 13, 1986, p. 1368 (based on reports published in 1985).

competitiveness and raise federal program costs. Because of increased worldwide competition in agricultural sciences as indicated by the rapid growth in science funding, the United States must meet this technological competition to remain a relatively low-cost supplier of wheat.

U.S. production costs per bushel will likely decrease, and wheat quality should be stable. The accumulated payoff of U.S. biotechnology research is expected to become pronounced after the year 2000 and should improve the U.S. capacity to supply lower cost, higher quality wheat. Because of the transferability of scientific information and technology, any competitive edge may be short lived, unless research programs are vigorously and adequately funded.

Research Needs

The general linkage between science/technology and productivity is well accepted as a longrun relationship in ex post facto analysis. However, ex ante estimation of this relationship is a relatively untouched area of research. The data limitations for this type of research may be insurmountable.

A methodology needs to be developed to compare the technological base of wheat-importing and wheat-exporting countries. Again, data limitations are a critical factor.

THE GREEN REVOLUTION FOR WHEAT IN DEVELOPING COUNTRIES

Gary Vocke

The Green Revolution has greatly increased the supply of wheat in the developing world and, through import substitution programs, has substantially reduced the role of some countries in the international wheat market. Government policy has significantly influenced the progress of this revolution. The experience of five developing countries--Mexico, India, Pakistan, Turkey, and Argentina--are reviewed here. These five countries represent about 70 percent of the total area in the developing world (not including China) that is planted to the semi-dwarf wheat varieties. I also discuss the prospect for introducing wheat into areas with tropical climates.

Major Importers Move Toward Self-Sufficiency

The key elements of the Green Revolution in Mexico, India, and Pakistan were semi-dwarf varieties, irrigation, and increased fertilizer use. Mexico became an exporter briefly, but is once again an importer because consumption is increasing even faster than production. In India and Pakistan, the increased output allowed imports to decline.

The semi-dwarf varieties were quickly adopted in Mexico, India, and Pakistan because of their high yield response to fertilizer and irrigation. The higher yields created incentives to shift resources from other crops to irrigated wheat production. The competitiveness of irrigated wheat was enhanced by government-supported prices and subsidized inputs. For example, high yields of semi-dwarf varieties in India financed tubewells to bring additional lands into irrigated wheat. Land was shifted from rainfed crops, such as coarse grains, to irrigated wheat. Thus, the semi-dwarf varieties also increased output through expanded area sown to wheat.

Wheat's Green Revolution in Turkey was initially limited to irrigated, Spring wheat regions on the coast because the semi-dwarf varieties were Spring wheats. The Green Revolution was later extended to dryland, Winter wheat regions with the improvement of management practices and the development of suitable varieties. The increased output allowed Turkey to export wheat for several years. However, production has stagnated recently, and the country is now a net importer.

The governments of these four countries (Mexico, India, Pakistan, and Turkey) used procurement programs and input subsidies to maintain a high relative profitability for wheat so long as domestic production substituted for imports. As these countries achieved wheat self-sufficiency, the incentives for producing wheat, rather than other crops, were reduced. The sacrifices of other national objectives became too great to continue favoring wheat so strongly. By lowering procurement prices and input subsides for wheat relative to other crops, governments reduced expenditures from their national budgets and provided incentives for farmers to shift land to deficit crops.

Wheat output is expected to increase in these countries because of expanded irrigation and increased fertilizer use. However, these countries are not expected to compete for U.S. wheat exports because they are modifying their policies to avoid creating subsidized surpluses that would be exported at a loss to their national economies.

Argentina to Continue as Exporter

Argentina did not follow the typical Green Revolution strategy. Unlike the other countries discussed here, wheat yields have not risen rapidly because Argentina's industrial development strategy has kept the farm wheat price low and the price of fertilizer high, thereby discouraging fertilizer use. Argentina increased its wheat output by adopting semi-dwarf varieties and by improving tillage practices, not by increasing fertilizer use. This program allowed Argentina to maintain its share of world wheat exports.

Research shows that increased fertilizer use can substantially increase yields. Thus, changes in Argentine policy to favor fertilizer use could significantly increase wheat production and exports.

Introduction of Wheat in Tropical Climates

The introduction of wheat production on a large scale in many developing countries is currently limited by the adverse effects of high temperatures on wheat growth and sometimes by unfavorable soil conditions; for example, hardpans in the rice paddies of Asia that are caused by puddling the soil for rice and acid soils in Brazil. The prospects for nonproducing countries to begin growing substantial quantities of wheat depend on solving these problems. Wheat production is being successfully introduced on a large scale in Bangladesh because suitable varieties and practices have been developed so that wheat can be multiple-cropped with rice.

VARIABILITY IN WHEAT LAND VALUES OF MAJOR EXPORTING COUNTRIES

John D. Sutton

Greater U.S. participation in world wheat markets has increased the potential exposure of American wheat producers to world price fluctuations. These fluctuations and the associated uncertainty about future price movements are transmitted through wheat commodity policies to prices received by producers and to expectations about net returns to land used primarily for growing wheat. Expectations about net returns have become increasingly important in determining U.S. farmland values in recent years. Greater variability in expected returns makes land values more variable.

In this paper, I compare variability in farmland values over the 1960-84 period in two major wheat regions of the United States, Australia, Canada, and France and in one region in Argentina. Variability is measured in terms of the coefficient of variation (C.V.).1/ I also examine the correlation between farmland values and (1) world wheat price and (2) wheat prices received by farmers. All values and prices are expressed in inflation-adjusted terms. I briefly review price-related policies for wheat in each country over the 25-year period to give a sense of U.S. policy objectives and those of its competitors.

Except for Argentina, variability in land values was low, 13 to 15 percent from 1960 to 1972, and did not differ appreciably among countries. Argentine wheat land values were considerably more volatile, varying 20 percent. Export prices of each country were much more stable during this period than during the subsequent 12-year period.

During 1973-74, variability of land values in the United States (14 percent), France (15 percent), and Canada (17 percent) was similar. Australian (27 percent) and Argentine (33 percent) land values fluctuated much more. The average for the six regions for which data were available both for 1960-72 and 1973-84 rose one-third in the latter period. Some of the turbulence of the world wheat market in 1973-84 may have been transmitted to land markets.

In three countries, differences in land value variability between regions of the same country in 1973-84 were striking: United States (North Dakota, 18 percent; Oklahoma, 9 percent); Canada (Saskatchewan, 23 percent; Manitoba, 12 percent); and France (Picardie, 11 percent; Centre, 20 percent).

The coefficient of variation captures only one aspect of a data set's variability. For example, both a steadily rising trend (as in Western Australia) and a widely fluctuating pattern of land values (as in Argentina) would have high C.V.'s. However, more uncertainty about future values would generally be found when past values fluctuated a great deal.

The C.V. also masks the duration of upswings and downturns. Land values in three regions--Centre, Buenos Aires, and North Dakota--peaked in 1976-77, several years before land values in other regions. The upswing lasted the longest--to 1982-83--in Australia. Canada's upswing was less rapid than in the United States, but it continued nearly as long as in Australia--through 1981. Argentine land values were never able to develop and sustain a trend.

1/ Standard deviation of a data series divided by the mean.

The correlation between land values and 3-year moving averages of world wheat prices differed markedly among countries and periods. The relationship in the United States grew from 0.5 in 1960-72 to 0.8 in 1973-84. It weakened markedly in Canada, from 0.8 in the first period to 0.5 in the second period. In Australia, the correlation was 0.8 in 1960-72 but merely 0.1 in 1973-84. The relationship was also weak in France, 0.4 in the latter year, the only period for which data were available. Argentine land values were uncorrelated to export prices in both periods. Except for the United States, the correlation between land values and export prices was low in 1973-84.

Since prices received by producers ought to be more important than world prices in determining net returns to land, I examined the hypothesis that land values were more highly correlated to world prices in countries where prices received by producers were highly correlated to each country's export price. The hypothesis was not supported. The average correlation during 1960-72 for the countries with data (United States, Australia, and Canada) was -0.7, and the correlation was very weak (0.2) for all five countries during 1973-84.

Wheat prices received by producers were more variable than export prices in each country (except France). During 1973-84, the countries with greatest land value variability, Australia and Argentina, also had the most variability in wheat prices received.

Each country, except Argentina, developed policies that tried to protect its wheat producers from fluctuations in world market conditions. Some of the major aspects and differences of these policies are as follows:

1. U.S. farm policy gave high priority to supporting both commodity prices and farm income. The nonrecourse loan program combined with large public and private grain storage provided both a world and a domestic price floor (at the loan rate), and it lessened price variability both for producers and world competitors in excess supply situations. The United States was the only exporter that explicitly managed its stocks to dampen swings in world supply.

2. France and the United States from the early seventies provided not only domestic price stabilization but also farm income support. French producers were the most completely protected of all competitors from international market fluctuations. A variable levy on wheat imports outside the European Community, high domestic wheat support prices, and "restitution" payments (approximately equal to the difference between world price and the generally lower producer price) to wheat exporters were the instruments of this protection.

3. Canada provided intrayear price stability, but no explicit stabilization from year to year. After the late seventies, worsening financial conditions at the farm level increased pressure to support farm income.

4. Even though Australia most frequently changed its formulas for stabilizing prices, its primary policy objective throughout the period was price support and stabilization. After 1979/80, policy became increasingly more market-oriented and less able to stabilize prices.

5. Until the late seventies, Argentina exploited the agricultural sector to support other areas of the economy. Wheat prices received by producers were, therefore, more volatile. Australia kept downward pressure on net

returns by imposing and frequently changing wheat export taxes and tariffs on imports of inputs and farm machinery. Since then, policy seems to be evolving toward development of the sector.

The nature of the transmission of world wheat prices to producers and land markets is unknown. International trade theory says that, under free trade conditions and additional, fairly restrictive assumptions, agricultural land markets are linked through commodity trade and arbitrage in factor markets. National policies affecting the relationship between export price and prices received by producers would interrupt this linkage. Differences in country policies may provoke different land market responses to world conditions. Empirical analysis to identify the relative importance of wheat pricing policies to farmland values in major wheat regions could help clarify the nature of the transmission mechanism.

PART IV

WHEAT EXPORT MARKETS--FACTORS AFFECTING SUPPLY, DEMAND, AND TRADE

SUMMARY OF EXPORT MARKETS

John D. Sutton and Ron Trostle

In the long run, U.S. competitiveness in the world wheat market depends on its production and marketing costs, adoption of new technology, and policies dealing with production control; grain marketing and trade; and the macroeconomy. These factors are generally within U.S. control. Our competitiveness also depends on these same factors as they are implemented by our major competitors.

Factors Within U.S. Control

Commodity, Macroeconomic, and Trade Policies

High loan rates relative to the world wheat price have often reduced U.S. exports because the Commodity Credit Corporation (CCC) purchased domestic production, thereby helping to stabilize world price at higher-than-free-market levels and promoting greater domestic and foreign production. Short-term money exchange rates accentuated these effects. The recent decline in the value of the dollar against the yen may not dramatically increase U.S. wheat exports if currencies in Australia, Canada, and Argentina remain weak. Current U.S. policy lowers loan rates, increases deficiency payments, and provides direct export subsidies. Even so, export expansion will still depend on competitors' supply responses and policy changes.

Production and Marketing Costs

Comparative data suggest that the United States and France have higher cash costs per unit of production than do Argentina, Australia, and Canada. Although U.S. marketing costs can add as much as 60 percent to cash expenses (for example, exporting from the Central Plains to the USSR), the U.S. grain marketing system is known to be efficient and low cost. Inland rail rates dropped as much as 25 percent in the early eighties in response to deregulation and other economic factors; inland barge rates are heavily subsidized and low; ocean rates are relatively inexpensive; and port facilities are excellent. Nonetheless, distances to ports are long, and lower shipping and handling costs would increase the U.S. market share.

Technology

U.S. wheat yields rose 2.1 percent annually from 1955 to 1985; they are expected to continue to rise at that rate for the next 5 years under normal weather. Lower wheat prices would probably slow down the adoption of high-yielding semi-dwarf varieties, irrigation, and fertilizer application. However, high deficiency payments, large acreage reductions, and smaller wheat acreage would offset these effects on wheat yields.

Factors Outside U.S. Control

France

French commodity and trade policies encourage and protect domestic production with high internal support prices, variable levies on imports from non-EC sources, and restitution payments to exporters that bridge the gap between high internal prices and lower world prices. Production costs of large French farms, the source of most production, are competitive with those of the United States. Inland marketing costs are very low. Yields have risen greatly, 3.3 percent annually over the past two decades. Although protein content is low, it is rising. New varieties in advanced stages of development indicate continued increases in both yield and protein content. French policy, like U.S. policy, is expensive, and there is growing awareness of its cost.

Australia

Australian commodity and trade policies have been shaped by highly uncertain yields stemming from poor soils and arid climate. Although Australia is known for its high-quality wheat, its export availability is considered unreliable because of variable production, lack of buffer stocks, inadequate throughput capacity at some ports, and disruptive labor practices. The last two 5-year plans have focused on improving markets. Marketing and handling costs are excessive. Marketing costs have quadrupled since 1960/61; storage capacity has exceeded production an average 35 percent since 1972, and labor practices have increased costs. A recently initiated Government study is investigating ways to improve the handling system. New varieties have permitted yields to rise on older wheat areas and have allowed cultivation on 3.5 million hectares of previously unsuitable land. No further area expansion is expected. Yield advances relative to competitors may be constrained because of natural resources, technology, and skills.

Canada

Canada, with a mature and relatively stable agricultural sector, is known as a reliable source of high-quality wheat. The Canadian Wheat Board gives Canadian wheat an edge in several ways: control over supplies through a quota delivery system, access to transportation through the Grain Transportation Agency, secrecy in pricing and negotiation, ability to conclude long-term agreements, and provision of export credits. Certain policies (the Western Grain Stabilization Act, the Advanced Payments Act, crop insurance, and the two-priced wheat system) have stabilized income or reduced production costs of wheat farmers. The grain-handling and transportation system was the major constraint to expanding wheat exports during the seventies. Policy changes, however, have since improved the system by increasing rail rates, providing more revenue for railroads, and shifting expenditures from the public to the private sector. On the negative side, labor unions are still able to organize costly work stoppages. Costs of production appear favorable with similar U.S. regions, although intercountry comparisons are difficult. Yields have risen more slowly in Canada since 1970 than in the other four major exporters. More severe climatic conditions than in the United States limit yield increases due to adoption of new varieties.

Argentina

National policy exploited Argentine agriculture to support nonagricultural sectors at least through the late seventies. Taxes were placed on wheat exports, and tariffs were imposed on imports of purchased inputs. The sector and its grain-marketing infrastructure are grossly undercapitalized. Port facilities are limited. Inland transportation costs are high. Major policy shifts are underway to promote sector development and boost export earnings. Substitution of a land tax for export taxes may intensify land use. How this will affect wheat relative to other crops is unknown.

Argentina is a low-cost producer relative to the United States. Producers have minimized onfarm investment and use of purchased inputs while increasing use of custom work. Argentine yields are low relative to those of the United States. To the degree that the public sector is willing to provide long-term, reliable support to agriculture, the sector should (1) become more efficient and (2) increase production.

THE U.S. WHEAT MARKET

William Lin and Robert McElroy

The U.S. competitive position in the world market will depend on its ability to deliver wheat at lower prices than its competitors. Delivery price in turn is closely linked to: (1) public policies dealing with production control, grain marketing, and grain trade; (2) exchange rate of the dollar relative to the value of foreign currencies and other macroeconomic policies; and (3) costs of producing and marketing wheat for export as affected by technology adoption and investment in marketing infrastructure.

A host of public policies have played very important roles in the development of wheat as a major U.S. export commodity. Foremost among those policies are the wheat programs in effect since the early thirties to control surplus production via acreage reduction and program payments, and to support and stabilize wheat prices through stockpiling the Commodity Credit Corporation (CCC) stocks and, since 1977, farmer-owned reserve stocks as well. In the past, higher loan rates relative to the world price, stockpiling of public stocks, and acreage reduction gave the United States a unique role as a shock absorber and a residual supplier in the world market. High loan rates raised world prices and thereby provided a world price floor for other exporting countries, lowering U.S. wheat exports. Acreage reduction programs shifted the supply curve to the left, raising world wheat prices and reducing U.S. wheat exports. Whenever target prices were set higher than the world price, deficiency payments amounted to an export subsidy as viewed by the rest of the world. The payments, therefore, lowered the world price and expanded U.S. wheat exports.

The Food Security Act of 1985 set the stage for lowering the world wheat price via a sharp decline in U.S. loan rates to $2.40 per bushel in 1986, down from $3.30 in 1985. A recent ERS study shows that a 25-percent decline in world wheat price could increase U.S. wheat exports by 14 million metric tons in 3 years. Meanwhile, wheat exports from Canada, Australia, and Argentina would decrease 2.8 million, 1.9 million, and 1.7 million metric tons, respectively. This magnitude of response from the rest of the world may be optimistic if: (1) wheat production in Australia and Canada is not responsive to price change; (2) Argentina is successful in converting export tax to land-based tax; and (3) competition between wheat and competing crops for land use is fully taken into consideration in the context of lower world prices for wheat and other program crops.

In the next 5 years, the scenario of farm commodity programs will most likely be characterized by low loan rates, high-deficiency payments, and large acreage reduction. Deficiency payments in 1986 could be as much as $1.98 per bushel, or $73 per metric ton. Wheat farmers are expected to participate in the program more because of high program payments, thereby gradually reducing acreage planted to and harvested for wheat. The decline in acreage, however, could be offset by a growth in wheat yields, which have averaged 2.3 percent a year since 1978. Therefore, U.S. wheat production will likely remain at 2.0-2.5 billion bushels through 1990. The U.S. wheat industry, however, will undergo further adjustments as inefficient and/or financially distressed producers exit the industry.

Since 1981/82 and until July 1985, the real value of the dollar weighted by trade volume was noticeably strengthened for wheat, compared with corn, soybeans, and all agricultural exports. The strong dollar partly explained the decline in U.S. wheat exports. Despite the recent decline in the value of the dollar against the Japanese yen since early 1985, the nominal wheat trade-weighted exchange rate of the dollar continued to rise, and the real exchange rate began to gradually decline after July 1985. The value of the dollar declined slowly partly because countries like Brazil, South Korea, Taiwan, and Hong Kong pegged their currencies to the U.S. dollar. Perhaps more important, Canada, Australia, and Argentina weakened their currencies relative to the dollar at the same time. For example, from September 10, 1985, to March 10, 1986, the Canadian dollar depreciated against the U.S. dollar by 1.5 percent despite the fact that Japanese yen appreciated against the dollar by 33 percent. Therefore, the recent decline in the value of the dollar against the yen may not dramatically increase U.S. wheat exports, if currencies in Australia, Canada, and Argentina remain weak.

Monetary and fiscal policies are also important to the U.S. competitive position via their effects on interest rates. A Federal deficit financed by issuing U.S. Government bonds and tight monetary policy tends to raise interest rates. The high interest rate in the early eighties was a major factor of the strong dollar. It also directly caused high interest expense, one of the most important fixed cost items for producing and marketing wheat, and it raised the cost of holding stocks.

In the long run, the U.S. ability to compete in the world wheat market is directly related to its costs of producing and marketing wheat for export. Production and marketing costs, as presented in this paper, do not directly address the issue of U.S. comparative advantage vis-a-vis other exporting countries (mainly Canada, Australia, the European Community, and Argentina). Instead, these costs reflect effects of existing technology, marketing infrastructure, input costs, and a host of public policies, tax laws, Government subsidies, and regulations on producing and marketing wheat for export.

Cash expenses for producing 1984 wheat in primary regions ranged from $87 per metric ton for White wheat to $110 for Soft Red Winter wheat (table 1). Fertilizer, fuel, and electricity were the most important line items of variable cash expenses.

Table 1--Cash expenses of producing U.S. wheat by class, 1984

Class of wheat	Cash expenses		
	Variable	Fixed	Total
	Dollar per metric ton		
Hard Red Winter	46	46	92
Soft Red Winter	68	42	110
Hard Red Spring	48	56	104
White	48	39	87
Durum	54	43	97

Costs of marketing U.S. wheat (including handling, storage, and transport) from farms to export ports ranged from $21.7 per metric ton for Hard Red Spring wheat to $32.9 for White wheat in the 1984/85 marketing year (table 2).

Table 2--Costs of marketing U.S. wheat from farms to export ports in the 1984/85 marketing year

Class of wheat	Handling costs	Storage costs	Transport costs	Total marketing costs
		Dollars per metric ton		
Hard Red Winter	3.8	5.6	23.2	32.6
Soft Red Winter	3.8	5.8	14.3	23.9
Hard Red Spring	2.9	5.0	1/ 13.8	21.7
White	3.6	5.7	20.7	30.0

1/ Shipments to the Great Lakes.

The costs of U.S. wheat shipments from farms to foreign destinations in selected importing countries appear in table 3.

Table 3--Costs of marketing U.S. wheat from farms to selected foreign destinations in the 1984/85 marketing year

Class of wheat	Handling costs	Storage costs	Transport costs	Total marketing costs
		Dollars per metric ton		
Hard Red Winter:				
China	5.0	6.9	35.9	47.8
USSR (Black Sea)	5.0	6.9	42.9	54.8
Soft Red Winter:				
Morocco	5.0	7.1	29.0	41.1
China	5.0	7.1	42.1	54.2
Hard Red Spring				
United Kingdom	4.1	6.3	25.4	35.8
Rotterdam	4.1	6.3	23.7	34.1
White:				
Bangladesh	5.0	6.9	45.7	57.6
Japan	5.0	6.9	39.9	51.8
South Korea	5.0	6.9	34.7	46.6

Marketing costs could be a substantial part of the total costs of producing and marketing wheat for export. Exporting Hard Red Winter wheat to the USSR, for example, cost $54.8 per metric ton, or 60 percent of cash expenses of producing that class of wheat in the Central Plains.

One of the factors affecting costs of producing U.S. wheat in the future is growth of wheat yields. The recent 2.3-percent annual growth rate will likely continue for the next 5 years under normal weather. Acreage planted to semi-dwarf varieties increased from 2.9 percent in 1964 to over 25 percent by the late seventies and continued to increase through the early eighties. High-yielding semi-dwarf varieties will continue to be adopted by wheat farmers, although the growth rate will probably slow down because of lower wheat prices. However, large acreage reductions, high deficiency payments, and smaller wheat acreage will raise average wheat yields.

The U.S. grain marketing system is known to be efficient and low-cost compared with most of the competing exporting countries, partly because of U.S. marketing infrastructure and marketing policy, which affects (1) the mode of transportation chosen to ship wheat and (2) costs of marketing wheat for export. Rail deregulation has helped to reduce costs of transporting wheat for export. For example, since 1980, the rail rate from Kansas City to the Gulf has declined 25 percent. Primarily because of Government subsidies, the inland waterway carriers have enjoyed a relative ton-mile cost advantage over other competing modes of moving wheat and other grains. Furthermore, the Food Security Act of 1985 exempts Government exports from cargo preference requirements. It is anticipated that rail deregulation will continue, and that grades and standards will be strengthened to assure high-quality wheat exports without excessive amounts of hidden dockage, foreign materials, and broken kernels. Legislation requiring inland waterway users' fee be paid by the carriers has certainly reduced the cost advantage.

Trade policy (including export enhancement subsidies, Government exports such as P.L. 480, and multilateral agreements) directly affects the U.S. competitive position in the world wheat market. Both export enhancement subsidies and Government exports attempt to expand the excess demand facing the United States. The Food Security Act of 1985 continues various export enhancement programs and P.L. 480. However, the United States is at somewhat of a disadvantage with its competitors because it has no grain board to guarantee bilateral and multilateral agreements.

Future research on U.S. wheat competitiveness in the world market should focus on the following areas:

- Quantifying the magnitude of the effect of Government subsidies and taxation on costs of production and marketing;
- Addressing the issue of U.S. comparative advantage in the world wheat market by measuring true societal costs of production and marketing, that is, opportunity costs in the absence of Government subsidies, taxation, and regulations;
- Approaching the issue of competitiveness by deriving supply and demand curves for U.S. wheat, an excess supply curve for U.S. wheat, and an excess demand curve facing the United States in the world market;

- Including more regions to compute costs of production and more ports in foreign destinations to derive costs of marketing wheat for export; and

- Quantifying the response by the rest of the world to a decline in the world wheat price by fully taking into account competition between wheat and competing crops for land use in the context of lower world prices for wheat and other program crops.

THE CANADIAN WHEAT MARKET

Pat Weisgerber, Mary Anne Normile, and Carol Goodloe

The Canadian wheat sector can best be described as a mature, relatively stable system. Natural resource constraints limit its capacity for expansion. Farm numbers and population have been contracting. But western Canada has a comparative advantage in growing wheat; large scale, very efficient technology employed in production and marketing gives this area an edge in growing and exporting wheat. Thus, Canada will remain an important wheat exporter, even though the export expansion of the early eighties will probably not continue into the nineties. Canada will continue to be a major exporter of high-quality bread and durum wheat, while trying to make inroads into less traditional, developing country markets where price is more important than quality.

A major question facing the Canadian wheat sector is: If the demand for Canada's traditional high-quality wheat declines because of changes in taste and technology, will the Canadian system (from the farmer to the Canadian Wheat Board to the transportation system) be able to sustain a relatively healthy wheat industry.

Production and Marketing Factors

Western Canada has a comparative advantage in wheat. Even in the current environment of low prices, wheat continues to be the best alternative for available resources, and wheat area is expected to stay high. Costs of production compare favorably with similar U.S. regions. Western Canada's traditional strength has been the production of high-quality, high-protein bread wheat, although supply can be erratic because of weather.

If demand for this product changes, a major question is whether Canada can produce and market a different kind of wheat as cheaply and efficiently as it now does. Soil conditions and climate limit the adoption of wheat varieties and new technology. The current system of grading and marketing has given Canadian wheat an excellent reputation; Canadian export standards are among the strictest in the world. But some members of the grain industry worry that the system is cumbersome and unable to adapt quickly.

As the monopoly exporter of western-produced wheat, the Canadian Wheat Board (CWB) has several features that give Canadian wheat an advantage in world markets: control over supplies through a quota delivery system, access to transportation through the Grain Transportation Agency, secrecy in pricing and negotiation, especially with state trading organizations, and ability to conclude long-term agreements. These factors are expected to continue to give the CWB advantages in exporting wheat.

Geography and logistics make the grain handling and transportation (GHT) system fragile at best. A powerful, unionized work force can institute strikes and work stoppages. The GHT system was the major constraint to wheat exports during the late seventies. Fixed, artificially low rail freight rates for moving grain to export positions inhibited investment in upgrading and modernizing the rail transportation system for grain. To help overcome the bottlenecks, the Federal and Provincial governments, along with the CWB, bought new railcars and made additional investments to improve facilities. Increased rail rates and other changes in 1984 were designed to provide more

revenue for the railroads and to shift expenditures from the Government to the private sector. The farmers' share of transportation costs will increase, but costs are expected to be offset by increased export volumes.

The system has performed well in the eighties and is not likely to falter over the next decade because of the many changes that have been made or will come about in the next 5 years.

Policy Factors Affecting Competitiveness

Many Government policies directed toward the agricultural sector have not had significant impacts on Canada's competitiveness. Canada is a price-taker in world trade, and Government policies cannot influence world prices. Although there is no explicit stock policy, working stocks are large because of the long pipeline. Stocks are used to facilitate marketing rather than to support farm income.

Other Government policies (the Western Grain Stabilization Act, the Advanced Payments Act, crop insurance, and the two-priced wheat system) have acted to stabilize income or reduce production costs to benefit wheat farmers. However, they may have also kept inefficient farmers in business, thus making any impact on competitiveness uncertain.

The Government does not directly subsidize wheat exports. Export credit is available through the CWB, which has helped the CWB make sales into certain markets, especially to centrally planned and developing countries. The program will likely continue, but how it affects competitiveness will depend partly on world market conditions.

Two macroeconomic factors, interest and exchange rates, have likely had opposite impacts on Canadian export competitiveness in the eighties. The depreciation of the Canadian dollar against the U.S. dollar since the late seventies has allowed Canada to capitalize on its weak currency by lowering its export price while returning more Canadian dollars to farmers. By keeping Canada's interest rate at a premium to the U.S. rate to prevent capital outflow, Canadian macroeconomic policy has disadvantaged wheat production by increasing farmers' borrowing costs.

Because macro factors are temporary and subject to change, whether they will confer a competitive advantage on future Canadian wheat exports depends on the world economic environment and on specific Canadian macroeconomic policy responses.

The Government is committed to the survival of the wheat sector in the sense that it is committed to the agricultural sector as a whole. Wheat production is the single most important commodity (in terms of cash receipts). As wheat goes, so goes most of Canadian agriculture. But Government policies rarely single out wheat producers as a group, and program benefits are spread among many farm types.

Demand Factors Affecting Competitiveness

Domestic demand for wheat for food is small relative to production and exports; it has been stable for many years. Wheat feeding is also quite small and increases significantly only if there is a poor quality crop that does not qualify for the higher grades. Domestic demand factors are not expected to play a role in Canada's future wheat competitiveness.

Further Research

Basic cost-of-production data are weak in Canada as in most countries. Data on actual sales prices of the CWB would be helpful in evaluating the extent to which the CWB takes advantage of market conditions in selling wheat. However, research could fruitfully address questions relating to the following areas: the effects of central selling (and buying) agencies on trade, the potential for increased production, the economics of intensive cultivation, the feasibility of production alternatives under different price scenarios, the location and nature of future demand, the effects of Government policy on the cost structure, and the real costs and benefits of policies and programs for wheat exporters.

THE AUSTRALIAN WHEAT MARKET

Paul Johnston

Although Australia is nearly the size of the lower 48 United States, it produces just 2 percent of the world's wheat from 3 percent of the world's wheat area. In contrast, the United States produces 13 percent of the world's wheat on 11 percent of the world's wheat acreage. Australia is able to export more than 70 percent of its wheat production because its 16 million people consume only 2-3 million tons of the 19 million tons produced. Australia accounts for 14 percent of world wheat trade, and wheat exports earn one of every five dollars of agriculture's foreign exchange.

As a price taker, Australia's competitive position in the world wheat market depends as much on the actions of other competitors as it does on its own. It is a country with a long history of wheat exporting and will match international competition on commercial sales. Yet, price is only one characteristic of a commodity, and Australia's competitive position also depends on its reliability as a supplier, wheat quality, credit facilities, and the type of wheat it has to offer. Australia's wheat is recognized as consistently free of foreign and broken material, disease, and pests. But Australia is not generally considered to be a reliable supplier above its long-term commitments to regular customers. Even though these commitments are met in years of low production, Australia's highly variable production, inadequate seaport capacity, periodic labor unrest, and general lack of buffer stocks make it difficult to consistently offer large volumes of wheat for sale on the international market.

Production

Notwithstanding these difficulties, Australia more than doubled its wheat production over the past 25 years. This expansion is dominated by the nearly 7-million-hectare expansion in the wheat belt rather than by improvements in yield. The wheat area increased from 5 million to 12 million hectares, whereas yield showed no trend. Yet the influence of yield on production is obscured by movement to wheat areas with less favorable climatic conditions. Over 3 million hectares of the added area was in dry western Australia where yields have historically been low. New drought-resistant wheat varieties made it possible for these drier lands to be cultivated, and new varieties improved yields on existing areas. However, the net effect was for average yield to be maintained, but not improved. If the recent, accelerated introduction of new varieties continues--44 new varieties were introduced in the last 5 years compared with 59 in the last 10 years--while wheat area remains about the same, aggregate wheat yields may indeed improve.

Government Intervention

Australian Government intervention, during the past 25 years, increased agricultural production by fertilizer subsidies, tax concessions, concessional loans, and research expenditures and reduced production by tariffs on agricultural machinery and materials. The Industries Assistance Commission calculated that, between 1970/71 and 1980/81, the wheat subsidy averaged $A5 per ton. Fertilizer subsidies and tax concessions together reduced costs about $A3 per ton. However, tariffs on machinery and materials raised costs about $A2.50 per ton.

Australia markets its wheat under national Wheat Marketing Acts. These acts not only establish the Australian Wheat Board as the sole marketing agency for wheat exports but also legislate a price-discriminating policy between domestic and foreign markets. The resulting income transfers between consumers and producers have favored consumers or producers for short periods; however, for the study period, net benefits have gone to producers. For an 11-year period beginning in 1970/71, when we have comprehensive information, the Industries Assistance Commission estimated that these transfers netted transfers from producers to consumers of $A324 million. That figure amounts to about $A2.50 per ton per year. When you add these transfers to the tax, input subsidies, and tariff costs, farm costs increased $A0.50 per ton.

The general objective of these acts was to improve the welfare of wheat farmers. Thus, they were designed to protect farmers from the disruptive effects of variable world prices. However, they have not been particularly successful in achieving this objective. Moreover, a cost-benefit analysis of Australia's first six marketing plans, covering 1947/48 to 1978/79, concluded that the marketing plans did not yield even a net benefit to growers, but rather increased consumer surplus and produced a loss in net social welfare.

Recent thinking among government policymakers reflects some of the concerns raised by the failures of past plans and the results of the cost-benefit study. The current focus is on carrying out activities that are economically justified from a national point of view rather than selecting one group, such as farmers, as the sole beneficiary of policy. Therefore, as the Wheat Board's price discriminating practices could not be justified in the national interest, the current (eighth) Wheat Marketing Act does not permit direct transfers from sales of domestic milling wheat. Such wheat is now being priced quarterly at export parity with a small margin to reflect the additional costs of servicing the domestic market.

However, an obvious breach of the asserted criterion of national public interest is found in the guaranteed wheat price. Large payments from general tax revenues are possible because the guaranteed price formula allows this price to exceed the actual price during a downswing in wheat prices.

Thus, Government subsidies and price fluctuations remain part of the wheat marketing system. Hence, because risk-averse farmers cannot expect to achieve price stability, production will be lower.

Marketing

The marketing of the growers' wheat from the farmer to the terminal port has become an increasing burden on net farm receipts as neither export nor producer prices have risen as much as marketing costs. At $A50 per ton, marketing costs account for 27 percent of the market value of wheat. Storage and handling costs contribute about 31 percent to marketing costs; freight, 35 percent; and interest and banking charges, 16 percent. These last costs have been the fastest growing in the past 10 years because of high interest rates and high first advance payments.

Storage costs have risen sharply because of the high cost of doubling storage capacity, a higher average volume of stocks, and union labor practices. The shortage of seaport capacity and work stoppages have necessitated delays in shipping and costly carryover storage. In the past 10 years, costs have averaged 2.5 times their level of the sixties.

Potential for Expansion

Australia's potential for export expansion will reflect production growth as domestic sales are increasing slowly. Production growth relies less on wheat area than on technology and management practices. New wheat varieties, crop rotation, and fertilizer have not noticeably improved overall yields during the past 25 years, pointing out the singular importance of rainfall as a constraint in wheat's expansion. Consequently, one of the remaining routes for expanding wheat production is the development of new drought-resistant varieties with high-yield potential in low precipitation areas. More efficient farm practices and control of diseases and pests will also reduce costs.

Extensive expansion in wheat area per farm will probably come from changes in relative prices of wool, beef, barley, oats, or sorghum. Changes in such relative or nominal prices produce changes in the wheat area per farm so that the proportion of total farm area in wheat has ranged from 16 to 23 percent.

One possibility for expanding wheat area would be to replace other crops with wheat. An additional 3.8 million hectares could be transferred to wheat production on the 38,000 wheat farms, and the wheat belt could increase nearly one-third to 16 million hectares. However, this expansion would require an extreme case of raising the relative wheat price rather than maintaining the usually closer relations of price movements of those commodities produced by wheat farmers.

Although past government intervention tended to promote production, current programs alter the mix of incentives and leave doubt as to the net effect on production. The income-tax averaging scheme is being changed to increase government revenues. The elimination of price discrimination and, hence, elimination of income transfers are of mixed benefit to growers. Although these transfers were costly to farmers in the seventies, they provided a net benefit for the 25 years under study. The tariff on agricultural machinery and materials is being replaced by a bounty on domestic production.

Research Recommendations

Several areas of research are recommended. Perhaps the most obvious is to analyze the production effect of the AWB's new guaranteed price policy for 1984/85 to 1988/89. Another is to study the relations among wheat research, new varieties, the rate of introduction of these varieties, and yields. Because Australia's reliability as a supplier becomes an issue whenever there is a drought, a pertinent question is: How does reliability affect buyers' decisions even in normal years? Another is: What impact do state railway monopolies have on freight rates. Correspondingly, determining the optimum number, type, and size of country elevators by State could help isolate the inefficient parts of the current storage system. Further research is necessary to examine whether Australia is a price taker or whether it has some market power as suggested by its characterization as a duopoly or triopoly. Other topics for research include: the response of existing and potential customers to extended credit or new financial arrangements, the tradeoff between high interest charges and farmers' returns from investments made possible by larger initial payments, and the criteria customers use in choosing between Australia's white wheats and the red wheats of the Northern Hemisphere.

THE FRENCH WHEAT MARKET

Mark D. Newman

France has become a major competitor in world wheat markets. Costs of production and marketing for those producers contributing the bulk of the surplus for export are extremely competitive with those of their U.S. counterparts. At least as important is the protection provided by national and European Community (EC) policies, prices, and export restitutions. Preliminary evidence indicates that, even if budgetary costs lead the EC to adopt more restrictive and less costly policies, France can remain a formidable export competitor.

EC Policy Encourages Wheat Production and Exports

The EC's Common Agricultural Policy (CAP) has been a major contributor to France's 10-percent annual growth rate in wheat exports during the past 15 years. The CAP encourages production with high and stable producer prices, and it uses export subsidies to facilitate exporting of surplus production.

In recent years, as EC prices have been restrained slightly in European Currency Unit (ECU) terms, the mechanisms of the European monetary system (Monetary Compensatory Amounts (MCA's) and green rates) have translated price decreases into nominal increases for French wheat producers. At the same time, variable levies have kept lower priced grains outside the EC from competing for EC markets. EC export restitutions (averaging $17 per ton of wheat in 1984 because of the strength of the U.S. dollar, but $69 per ton in 1982) have contributed to the competitiveness of French wheat in world markets despite high producer prices. Although in 1986 dollar terms, producer prices are once again higher in France than in the United States, a strong dollar meant that they were lower in 1984.

France is the EC's largest wheat producer. Production in 1984 of 33 million metric tons, the largest on record, represented 43 percent of EC-10 production and 6.3 percent of world production. France exported 18.9 million metric tons of wheat in 1984/85, including 6.3 million tons to other EC countries. French wheat exports accounted for 67 percent of the EC-10 total and 13 percent of world exports.

Of French wheat exports, 92 percent were destined for other European countries (including the USSR) or Africa in 1984/85. Flour exports are concentrated in African markets, with 60 percent going to Egypt in 1984/85 and 12 percent going to Subsaharan Africa.

Wheat Production Higher than Consumption

French wheat production has tripled since 1960, due primarily to yield increases that brought average yields in 1984/85 to 97 bushels per acre for soft wheat. Durum wheat production has increased more than sevenfold since 1965, but has fallen from its 1975 peak. Soft wheat is the primary contributor to French wheat exports, although a small amount of Durum is exported. Over the past two decades, soft wheat yields have increased an average of 3.3 percent annually; protein content has increased, averaging 12.1 percent in 1984. Other factors contributing to the baking quality of many varieties have also improved. French technological progress continues with recent announcements of test results for biotechnological and hybrid wheat seeds with yields surpassing those previously attainable by 6-21 percent.

Much of the production growth that has contributed to the development of exportable surpluses comes from a relatively small proportion of French farms. In 1982/83, 20.3 percent of those producers marketing grain who had more than 100 hectares of grain area delivered 73.5 percent of the marketed cereals in the country.1/ Cost data from a limited sample of larger producers indicate that these farms face production costs that are very competitive with those of U.S. producers.

Thus, for at least some producers, wheat production will continue to be profitable, even in the event of major EC price reductions. Comparisons with U.S. production costs are complicated by the limited availability of comparable data and the extreme volatility of currency exchange rates in recent years.

With declining bread consumption, domestic wheat use in France has increased only slightly despite a doubling of feed use over the past two decades. Thus, wheat production has far outstripped domestic demand, rising from 117 percent of domestic use in 1960 to 319 percent in 1984. Exports and stocks have absorbed the difference, with exports rising to 18.9 million tons, 12 times their 1960 level of 1.5 million metric tons. French wheat in intervention stocks reached 2.9 million tons at the end of the 1984 marketing year, accounting for 28 percent of the EC-10 total. This has increased both national and EC budget costs.

Low Marketing Costs

Preliminary findings indicate that marketing costs for French wheat also contribute to its competitiveness. Inland waterways facilitate transportation of exports to some European neighbors. For exports by sea, distances to ports are short relative to distances from the primary U.S. wheat-producing regions to ports. Because of the short distances, a large proportion of export shipments move to port via truck; the rest move by rail or barge. Modern, efficient port terminal facilities and short distances to primary export markets also give France a competitive advantage in ocean transportation costs.

Research Needs

Production and marketing costs for some producers are important to the competitiveness of French wheat in international markets. Further analysis of these factors can be improved considerably through access to broader, better quality data than were available for this preliminary study. Institutional factors are also extremely important in competitiveness for sales. EC price policies, national concessional credit and credit guarantee programs (COFACE), export restitutions, and historical trading relations play important roles. Recent introduction of a new export grade certification program in France may also influence competitiveness. Developments in the use of wheat gluten to fortify soft wheat flours will make them better substitutes for hard wheat. All these factors merit further attention in future research.

1/ B. F. Stanton. Production Costs For Cereals in the European Community: Comparisons with the United States, 1977-1984. Ithaca, NY: Cornell University. Agricultural Economics Research Report 86-2, Mar. 1986, p. 37. Based on data from the French Office National Interprofessional des Cereals (ONIC). Report prepared under cooperative agreement with the Western Europe Branch, IED, ERS, USDA.

THE ARGENTINE WHEAT MARKET

Jorge Hazera

Argentina is currently the lowest cost supplier of wheat in world markets. Farmgate prices are low because of a costly grain-marketing infrastructure and export taxes on agricultural products. Producers have responded to the low prices by adopting production practices which keep costs low. Future Argentine competitiveness will be contingent on improvements in the marketing system and less burdensome agricultural policies. Neither expanding wheat area nor increasing yields appear to be effective constraints. Argentina's diversified agricultural sector gives producers the flexibility to produce considerably more or less wheat, depending on relative prices and on policies affecting wheat production and exports. Prospects for lower world commodity prices may dampen the Government's resolve to stimulate the agricultural sector. Lower crop prices may also divert needed investments in grain production and marketing.

Dominance of Agriculture in the Economy

Argentina exports about 70 percent of its grain and oilseed output, exporting 30 million tons in 1984 compared with 125 million tons by the United States. Argentina is the world's second largest grain, oilseed, and subproduct exporter; the second largest in coarse grain exports, the third largest in oilseed and subproduct exports, and the fifth largest in wheat exports. The agricultural sector accounts for 15 percent of Argentina's gross domestic product (GDP), and agricultural marketing accounts for an additional 10 percent. Agricultural exports account for 80 percent of foreign currency earnings, and taxes on agricultural exports generate 25 percent of central Government revenues.

Government of Argentina (GOA) projections for grain, oilseed, and subproduct exports are for 40-50 million tons by the year 1990, but these targets will not be reached unless the Government relaxes taxes on agricultural exports and unless the grain-handling infrastructure receives sorely needed investments.

Foreign Debt Cul-de-Sac and Agricultural Policies

Latin American debtors are adjusting macroeconomic and sectoral policies to meet the challenge of the debt crisis. Domestic savings are being generated by austerity, protectionism, export enhancement, and privatization, but these savings are barely enough to cover debt servicing. However, given the realignment of economic policies in Latin America, foreign investments in the region may exceed debt servicing and capital flight, resulting in net capital inflows. Net inflows could stimulate economic growth, reversing the spiral of capital outflow and recession.

Argentina's US$50-billion foreign debt is equivalent to 70 percent of GDP. Interest on the debt is equivalent to nearly 50 percent of export earnings, or nearly 100 percent of the balance of payments surplus. The country is in an economic cul-de-sac: that is, debt servicing requires economic growth, but economic growth requires savings and investment, which are being completely absorbed by debt servicing.

Argentina's economic predicament has forced policymakers to re-evaluate economic strategies. Argentina has traditionally subsidized industrial development by taxing the agricultural sector. But traditional policies have not succeeded. Despite subsidies and protective tariffs, most state-run industries continue to run deficits. Nonetheless, agriculture has continued to expand despite government policies.

The emergency nature of the debt crisis and the need for a long-term strategy for economic recovery may force the GOA to realign itself on the side of agriculture. Argentina's agricultural resources are underutilized, and its grain-marketing infrastructure is grossly undercapitalized. Investments in the agricultural sector would spur exports and would help resolve the country's economic situation. The government recognizes this problem, and it is already moving in the direction of agricultural reforms. Reducing taxes on agricultural inputs is one example. But the most important initiative is still underway, that is, the replacement of agricultural export taxes with land-based taxes.

In 1986, the World Bank approved a US$350-million loan for Argentina's agricultural sector. The loan is designed to help Argentina make the transition from agricultural export taxes to a land-based tax system. Export taxes have been a disincentive to increasing agricultural production. Conversely, land taxes may spur crop production by forcing idle lands and pastures into cultivation and by increasing the use of farm inputs.

Under the current tax system, the Government can mitigate the transmission of world prices to domestic prices by reducing export taxes when world prices fall, and vice versa. However, as export taxes are reduced during the transition from export taxes to land-based taxes, domestic wheat prices can be expected to improve relative to world wheat prices. Once the transition is over, domestic prices will be closer to world prices, and the transmission of world prices to domestic prices will be more direct.

Cost of Production and Marketing Considerations

Argentine production costs are low. Farmgate prices have been well below those in other exporting countries because of high export taxes, exchange rate policies, and a costly grain-marketing system. Farmers have adjusted to low prices by maintaining a low-cost structure, and input use in Argentina is the lowest of the major grain exporters. However, yields are surprisingly high because farmers are quick to adopt low-cost technology, particularly soil conservation practices and sophisticated crop rotation schemes. Additional production is likely to come out of area expansion and more horsepower, not agrochemicals.

Argentina's marketing infrastructure is costly and inefficient. The infrastructure poses important constraints on the country's ability to increase export volume, and it tends to depress export prices, particularly for wheat.

The grain-marketing system cannot be compartmentalized; instead it is a combination of integrated parts. In Argentina, for example, the scarcity of storage capacity makes it necessary to coordinate the work of grain transportation, grain reception at the port, and grain embarkation.

Nearly two-thirds of Argentine grain is produced within 150 miles of export terminals. The trucking industry moves most of this grain to the ports since trucks are efficient on the short hauls. However, trucks are small by U.S. standards, and annual operating mileage is low. Owner-drivers make up a large part of the trucking firms, and their unions are well organized.

The rail transportation network will need to handle future increases in production because additional production will come from more distant regions. The railroad is considered more efficient for the long haul. But, the government-owned railway system is in a period of relative stagnation and deterioration. Although grain exports have doubled in the past decade, grain transported by railcar remains nearly unchanged. The share of exports transported by rail diminished from about 56 percent in 1974 to 30 percent in 1985. Operating costs for the railroad system are high because of poor track conditions, small boxcars, inefficient yard operations, and inadequate loading and unloading facilities. Three different gauges of track reduce the compatibility of equipment, and railcars are used to supplement storage, decreasing turnaround time for railcars. Demurrage rates are not charged against the port elevators for railcars because both are government owned and such charges would simply switch money from one government sector to another. However, trucks are given unloading preference and are allowed to block rail movement as they are paid demurrage.

Because of government regulations, barge freight rates are noncompetitive. Most production is centered close to ports on the lower Parana River, which may receive ocean-going vessels. If grain production increases in northern Argentina, however, use of barges to move grain down the Parana River may increase.

Argentine grain storage capacity has increased markedly in recent years, from about 15 million tons in the early eighties to nearly 30 million tons currently. Considering the volume of the past three harvests, storage capacity is less than 70 percent of production. This storage capacity is significantly less than that in the other major exporting nations. As a result, Argentina is forced to sell its grain quickly; given current world market conditions, this constraint means that Argentina is obligated to offer significant discounts in export pricing. During the higher prices of a few years ago, economists argued that Argentina did not need additional storage because it would move its grain into world markets when Northern Hemisphere supplies were low.

The throughput ratio is the ratio of the average monthly export volume to the maximum monthly export volume. It may be used to measure the efficiency of export terminals. A high throughput ratio reflects capacity utilization, adequate storage, and reduced seasonality. A low throughput ratio reflects export seasonality, underutilized capacity, and a general lack of integration into the marketing infrastructure and/or inadequate grain storage capacity. In 1984, the monthly average throughput ratio for the major Argentine ports was 59, up from 29 percent for 1977-80 and from 22 for 1973-75. In 1984, nearly 40 percent of Argentine wheat exports moved through the port of Bahia Blanca, representing 60 percent of Bahia Blanca's total export volume for the year. About 75 percent of Bahia Blanca's wheat volume was exported within 3 months of the harvest in December, representing extreme seasonality. Tables 1 and 2 show the throughput ratio for the major Argentine ports. In addition, these tables show the annual grain volume and the seasonality of exports by port.

Table 1--Wheat, total agricultural exports, and throughput ratios by principal wheat ports, Argentina, 1984

Major ports	Wheat ranking	Wheat exports	Total ag. exports	Ratio wheat/total	Throughput ratio
	1-12	---1,000 tons---		---Percent---	
Rosario	3	1,066	7,978	13	53
Bahia Blanca	1	2,782	4,652	60	52
Buenos Aires	5	485	4,653	10	60
San Lorenzo	4	683	3,342	20	49
Quequen	2	1,271	1,992	64	40
San Nicolas	7	303	1,346	23	54
Villa Consti.	6	386	1,167	33	45
San Pedro	8	103	487	21	39
Diamante	10	36	288	13	31
Santa Fe	12	23	153	15	23
Mar de Plata	9	103	119	87	33
Other	11	28	78	36	na
Total 1/	--	7,269	26,255	28	59

-- = Not applicable.

1/ Total includes other minor ports, including Barranqueras, Cuenca del Uruguay, and Ramallo.

Table 2--Average monthly wheat and total exports by quarter and principal ports, Argentina, 1984

Major ports	Jan.-Mar.		Apr.-Aug.		Sept.-Dec.	
	Wheat	Total	Wheat	Total	Wheat	Total
	1,000 tons					
Rosario	289	424	34	746	1	199
Bahia Blanca	589	606	164	452	50	109
Buenos Aires	126	213	20	371	2	118
San Lorenzo	185	233	8	263	23	58
Quequen	253	263	71	109	40	42
San Nicolas	84	126	9	172	2	28
Villa Consti.	89	129	22	143	3	16
San Pedro	34	48	0	66	0	3
Diamante	12	31	0	39	0	0
Santa Fe	5	16	2	19	0	2
Mar de Plata	20	20	4	7	7	7
Total 1/	1,686	2,109	382	2,394	127	586

1/ Total includes other minor ports, including Barranqueras, Cuenca del Uruguay, and Ramallo.

The Outlook for Wheat Exports

In 1984, Argentina's share of the world grains, oilseeds, and subproducts market was 9 percent, compared with 37 percent for the United States. This makes Argentina the world's second largest exporter of grains, oilseeds, and subproducts, and coarse grains, the third largest in oilseeds and subproducts, and the fifth largest in wheat.

Wheat is Argentina's principal export, representing about 12 percent of total export earnings. Argentine wheat exports represent nearly 70 percent of annual wheat production, accounting for 8 percent of world wheat trade. In the past decade, wheat exports tripled because of a doubling of production and stable domestic consumption. However, the prospects for additional wheat exports from Argentina are limited, even within the context of the government's ambitious export targets.

Because 50 percent of wheat area is double-cropped with soybeans, Argentine wheat producers are sensitive both to the relative prices for wheat and soybeans and to the yield differentials between early-planted soybeans and late-planted or double-cropped soybeans. Wheat area could diminish significantly if returns from early-planted soybeans show a marked improvement. In the context of production alternatives and competition for limited resources, one must view Argentine farmers as multienterprise, market-oriented producers. Argentine farmers are sensitive to relative prices for crops and livestock, and they can easily switch to production alternatives, principally wheat, corn, sorghum, soybeans, sunflowerseeds, flaxseed, and beef cattle. One should also recognize that all these commodities compete for the same marketing infrastructure--with a demonstrated export capacity of nearly 30 million tons annually.

If wheat prices decline relative to feed grain and oilseed prices during the next 5 years as currently forecast, then Argentine wheat export availabilities are not expected to rise much above 1984's 8.5 million tons. In contrast, Argentine feed grain and oilseed exports may continue to expand rapidly.

Research Needs

The Government is trying to increase agricultural productivity and output to increase exports and improve its balance of payments. Agricultural exports are important because they account for 80 percent of Argentine foreign currency earnings. The Government may stimulate the agricultural sector by switching from export taxes to land taxes and by reducing relative prices for agricultural inputs. Improvements in the transportation and handling system may also be emphasized to reduce the seasonality of Argentine exports and to increase Argentina's bargaining power for higher prices. Such improvement may benefit U.S. farm exporters to the extent that they reduce seasonal price undercutting by Argentina. The impact of alternative policies on agricultural production, processing, marketing, exports, and prices needs to be researched.

PART V

WHEAT IMPORT MARKETS--FACTORS AFFECTING SUPPLY, DEMAND, AND TRADE

SUMMARY OF IMPORT MARKETS

James A. Langley and Gene A. Mathia

The major importing countries considered in the Wheat Prototype Study are Mexico, China, the USSR, Eastern Europe (Bulgaria, Czechoslovakia, the German Democratic Republic, Hungary, Poland, Romania, and Yugoslavia), Brazil, and North Africa (Egypt, Tunisia, Algeria, and Morocco). This summary focuses on the issues likely to affect the consumption, production, and trade patterns of this set of countries.

These importing countries may be classified into three groups: (1) essentially self-sufficient (Mexico and Eastern Europe); (2) importers that depend upon nonprice factors (North Africa and Brazil); and (3) importers that react to price (USSR and China). Each group has different implications for the wheat export market.

Essentially Self-Sufficient Importers

Mexico and most of the East European countries are essentially self-sufficient in wheat production. Poland and the German Democratic Republic are the most significant wheat importers in this group.

Through the adoption of Green Revolution technology, Mexico has achieved one of the highest wheat yields in the world, almost double those in the United States. Wheat in Mexico is produced primarily on private farms, which tend to be heavy users of subsidized production inputs, including credit. Hence, these producers would be sensitive to changes that affect costs of production. Prices are regulated by the government.

Wheat is used predominantly as a food grain in Mexico, although an increasing amount (about 25 percent of domestic supply) is fed to poultry and other livestock. Favorable wheat/grain sorghum price ratios have recently led to imports of feed-quality wheat. Wheat consumption as food in Mexico is stimulated by rapid population growth (currently 2.5 percent per year), expanding real incomes, and policies that hold down consumer prices. Corn is still the dominant food grain in rural Mexico, but rapid urbanization has increased wheat consumption, as urban consumers tend to prefer bread to corn tortillas.

In contrast to the rapid growth in wheat consumption in Mexico, per-capita food consumption in Eastern Europe is fairly stable. People in this region tend to have adequate diets, with potential per capita growth in consumption coming mainly from fruits and vegetables and from meat products. There appears to be nothing on the technology horizon that would increase wheat production. Hungary tends to export wheat to the USSR under long-term agreements. Poland and the German Democratic Republic are the main importers of wheat in Eastern Europe, but these imports depend on foreign exchange availability. Hence, favorable trade agreements are important.

Being essentially self-sufficient, Mexico and Eastern Europe would be expected to import wheat only in the event of a domestic production shortfall or a shift in economic fortune. Lower oil revenues have led Mexico to re-evaluate the level of its production and consumption subsidies. The effect of this reduction in subsidies on production and consumption incentives remains to be seen. No evidence suggests that Eastern Europe will return to the very large imports as in the late seventies and early eighties. Mexico and Eastern Europe do not seem to be strong growth markets for wheat exports in the near term.

Response to Nonprice Factors

Brazil and North Africa have many similarities in terms of wheat imports. Both exhibit a system of subsidized domestic demand combined with severe production constraints.

The North African group (Egypt, Tunisia, Algeria, and Morocco) accounts for about 12 percent of annual world wheat imports (14 million tons in 1985). All indications are that these nations will remain net importers. Wheat, particularly in the form of bread and couscous, is the mainstay of the diet for this rapidly expanding population of 108 million. Consumer wheat products have been, and will continue to be, heavily subsidized.

North African wheat production is constrained by an arid climate. Although increased attention is being given to agriculture, yields are unlikely to close the gap between consumption and production.

The continuing status of North Africa as a net importer should be good news to exporting countries; however, the North African countries are severely constrained in terms of foreign exchange from purchasing wheat on the world market. Hence, political and economic factors combine to create a marketing situation in which price differs significantly from cost. The availability of nonprice factors--especially attractive credit terms--largely determines the annual market shares of suppliers in this market.

Even though wheat is the only crop in Brazil that is supported above the world price and although wheat is the only food subsidy program in the country, domestic producers have not been able to respond adequately. Wheat is one of the few crops that does not grow well in Brazil. Significant research expenditures have been made, attempting to import Green Revolution technologies, but they have not paid off. Hence, Brazil will likely continue to be a significant importer.

Wheat is an important part of the Brazilian urban diet. However, per capita consumption tends to follow changes in the subsidy level. Because of the subsidy system, world prices have only a tangential effect on wheat. Production, consumption, and imports reflect nonwheat market effects. Because price responsiveness is practically zero in the short run, the availability of credit affects Brazilian wheat import decisions.

Brazilian imports from individual exporters are quite variable. For example, in 1982-84, Brazil was short of foreign exchange. The level of wheat imports was not affected, but it mattered greatly from whom the wheat was purchased. Canada has a long-term agreement with Brazil, leaving the United States and

Argentina to compete for the residual. Australia, because of its distance, and the European Community, because it does not have the desired quality, are not significant players in the Brazilian wheat market. Hence, the residual Brazilian import market became a tradeoff between U.S. credit terms and the status of the Argentine clearing account. The clearing account is a bilateral trading account between Argentina and Brazil that Argentina usually requires balancing through wheat exports to Brazil. The U.S. market share tends to depend on the Argentine crop. When Argentina has wheat to export, the U.S. share of the Brazilian market drops.

Brazil has recently renegotiated its long-term agreement with Canada for a minimum of 100,000 metric tons per year. The Canadians are willing and able to meet U.S. credit terms. However, because of an improvement in the Brazilian economy and a surplus in balance of payments, credit availabilty is less important than before.

Responsiveness to Price

Of the importing countries considered in the Wheat Prototype Study, the USSR and China show the most promise as significant commercial wheat importers. Availability of cash for foreign exchange will always be a concern of any importer, but these countries are in relatively stronger fiscal positions than the others (except, perhaps, for Brazil in recent years).

China has run the range from exporter of grain in the fifties, to some imports in the sixties because of supply-side disturbances, to significant imports during the seventies because of rapid increases in income (annual income growth in gross national product of 6-8 percent), and relaxation of consumption constraints. In the recent past, wheat production in China has grown about 4.6 percent per year. Even though total area sown has declined slightly, wheat area has gained in relation to area sown to rice, coarse grains, and tubers. Through introduction of new varieties and large increases in fertilization and irrigation, China has achieved the highest level of wheat production in the world. However, China has an even higher level of domestic demand. Hence, Chinese wheat imports are expected to grow in the future. China's main suppliers are Canada, Australia, and the United States.

The USSR has had three longstanding agricultural policy goals: low and stable food prices, increases in livestock and fruit and vegetable production, and self-sufficiency in grain production. Prior to the seventies, the USSR was a net exporter of grain, exhibiting low levels of grain use. Emphasis on upgrading consumer diets in the seventies led to large, but erratic, purchases of foreign grain. During this time, foreign exchange increased. Soviet grain imports vary according to the size of the domestic crop. Numerous crop shortfalls since 1980 have led to increased reliance on imported grain.

The USSR has made massive investments in agriculture because of its desire for self-sufficiency. Yields have trended upward, but are quite variable. There are problems in increasing inputs in grain production because of low-quality fertilizer and poor plant varieties. The USSR has not been successful in getting its farmers to produce high-protein wheat varieties (for example, Durum), making them dependent on other countries for milling-quality wheat varieties. About a third of Soviet domestic wheat production is fed to livestock. Up to 20 percent of the domestic crop is lost each year because of weather and poor handling.

Because of foreign exchange constraints, the USSR has been willing to substitute among grain types and sources of imports to minimize the import costs. The USSR imports wheat from both the Northern and Southern Hemispheres. Its import demand tends to be very sensitive to the terms of trade between the revenue from energy exports and the price of imported grain.

Conclusions

Nations import wheat because domestic consumption exceeds domestic production. Domestic consumption is augmented in each of the importing regions reviewed with significant consumer subsidies for bread and other wheat products. When offered for an extended period, food subsidies become so imbedded in a society that even rumors of their removal often lead to riots. Hence, governments are reluctant to substantially alter these consumption incentives. However, government subsidies for other grains, oilseeds, and livestock products may alter consumption habits for wheat over time. Another factor positively affecting wheat consumption is population growth, which has slowed in many countries but remains relatively high in Mexico and North Africa.

Most nations also offer producers significant incentives to grow wheat. These incentives range from price supports to subsidies on productive inputs. Investment in agricultural infrastructure has been substantial. Thus, yields have continued to trend upward, and serious attempts have been made to expand wheat acreage in each region. Public investment has tended to pay off in Mexico and most of Eastern Europe, which have become essentially self-sufficient in food-quality wheat production, and it has helped to increase wheat production in the USSR and China substantially. However, natural and climatic conditions in Brazil and North Africa have prevented significant expansion of wheat production, despite sizeable public investment projects.

In each of the six regions considered in this study, government agencies control imports. Net results of the underlying forces on consumption and production behavior presented here suggest the following tentative conclusions about these import decisions. Mexico, Eastern Europe, and Brazil seem not to be big growth markets for wheat imports from the United States. U.S exports to these regions will continue to offset domestic crop shortfalls in Mexico and Eastern Europe, or when Argentina does not require the Brazil/Argentina trade account to be balanced with its own wheat exports. The USSR will likely continue to import wheat, depending on the size of its domestic crop. Soviet imports, while trending upward in recent years, tend to be quite variable. The most significant growth trends in wheat imports are North Africa and China. However, there are severe foreign exchange constraints on North African imports, requiring exporters to offer considerable discounts and easy credit terms.

These factors may significantly constrain effective demand for wheat at market prices. Availability of credit is often mentioned. Exporters able to offer the best credit and sales terms tend to have an upper hand. Exporting nations have a stake in the continued economic development of these and other importing nations, as future increases in effective demand depend upon continued increases in personal income and foreign exchange earnings in the importing countries.

One cannot know from the information presented here what direction world trade in wheat will take or what share of this world wheat market the United States will have. Only six major importers are studied. These six regions accounted for 46 percent of total U.S. wheat exports in 1983/84 and for 35 percent in 1984/85. Other significant importers of U.S. wheat are Latin America (less Mexico), South America (less Brazil), Japan, and other Asian countries. Information on consumption, production, and trade trends of these regions are needed before an evaluation of world wheat trade can be completed.

THE MEXICAN WHEAT MARKET

Myles J. Mielke

Mexico exported wheat during most of the sixties, but never more than 0.5 million tons in any one year. Beginning in 1971, Mexico became a net wheat importer of over 1 million tons in some years. Mexico is currently self-sufficient in food wheat and will likely be only a minor feed wheat importer during the next few years, although a production shortfall or a shift in economic fortunes could once again create a large import demand.

Trade and Macroeconomic Considerations

Trade policies, such as tariffs, had little impact on the volume of wheat imports in the past. The Government was committed to providing food staples to the Mexican population at subsidized prices, particularly to lower income groups, a commitment that meant adjusting food imports to meet domestic requirements. Macroeconomic policies may have had more of an impact on increasing wheat, as well as other food, imports. An overvalued exchange rate (predominant during 1970-81) probably encouraged imports by reducing government import costs. Low (subsidized) interest rates also helped reduce producer costs, thereby contributing to lower consumer prices, which encouraged demand.

Since 1982, the economy has been weakened by large public debts, high inflation, low wages, and high unemployment. Significant policy changes have eased Mexico's serious financial situation. Interest rates have been raised to market levels, and the peso exchange rate is being brought into equilibrium with major foreign currencies, primarily the U.S. dollar. Producer and consumer subsidies are being eliminated under pressure from the International Monetary Fund and other foreign lenders. This trend will likely continue as long as Mexico's domestic and foreign debt burdens are heavy.

In the face of its current economic situation, Mexico is re-evaluating its past position and is moving toward market-oriented trade. The government is removing prior licensing requirements for imports and is substituting a tariff schedule. It is also allowing private sector traders to import directly rather than purchase their goods from CONASUPO, the national food-marketing agency. Mexico's accession to GATT membership could be a significant step in making its trade policies more responsive to changes in international conditions. An important caveat, however, is that trade policies will continue to be subject to domestic economic policy considerations that adjust slowly to changing international situations.

Characteristics of Wheat Production

Mexican wheat is grown largely in a semiarid climate under irrigation that uses water collected in rainfed reservoirs. It is heavily fertilized and grown mostly on commercial farms that use other modern technology, including high-yielding wheat varieties, insecticides, herbicides, and machinery. The combination of these factors produces one of the world's highest average wheat yields (4.2 mt/hectare for 1983-85), which is two-thirds higher than the average U.S. yield (7, 8).

Mexican wheat production benefited from the technological developments of the Green Revolution and from large public investments in irrigation. National wheat yields more than doubled between the early sixties and the eighties. By contrast, area planted to wheat declined in the sixties and early seventies and did not begin to recover until the eighties (1).

A major factor contributing to the success of Mexican wheat yields has been government-sponsored programs that subsidized production inputs. As a result, producer prices have increased faster than prices of most production inputs (table 1). Producer prices were even more attractive if we consider the large subsidy for irrigation water--85 to 90 percent of the wheat area is under irrigation. This subsidy amounted to almost 90 percent of the cost of irrigation in the early eighties (6). Wheat producers also benefited from below-market interest rates and subsidized crop insurance.

Table 1--Mexico: Producer wheat prices relative to input prices 1/

Year	Prices						
	Gen. input	Fertilizer	Seed	Machinery	Diesel fuel	Rural wages	Water rates
	1968=100						1970=100
1968	100	100	100	100	100	100	NA
1969	100	93	97	100	100	100	NA
1970	101	93	94	101	100	86	100
1971	101	98	93	100	100	86	102
1972	102	107	101	109	109	79	101
1973	98	89	101	101	109	75	72
1974	123	123	106	124	104	82	108
1975	158	165	108	142	140	96	131
1976	137	134	93	92	140	74	132
1977	109	122	90	95	126	67	98
1978	120	137	90	104	160	74	105
1979	119	148	85	101	120	71	117
1980	121	149	74	102	142	74	101

NA = Not Applicable.
1/ Ratio of producer price index to input price index.

Sources: (2, 3, 6).

Factors Affecting Wheat Demand

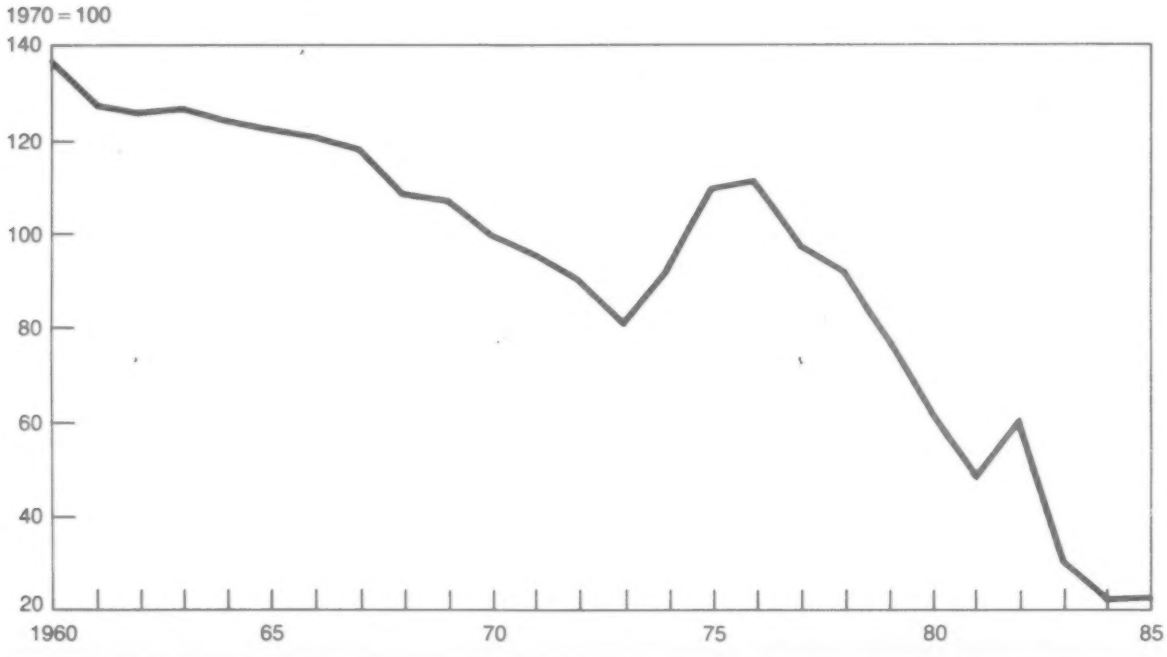
Wheat is predominantly a food grain in Mexico, although an increasing amount is fed to poultry and other livestock. About one-fourth of the current domestic wheat supply is used as feed. The bulk of the wheat is consumed in urban areas, where flour mills and bakeries are concentrated.

Domestic demand outpaced production over the past 25 years (8). Wheat consumption was stimulated by rapid population growth, expanding real incomes, and policies that held down consumer prices. Population grew over 3 percent annually during most of the sixties and seventies. High real income growth, resulting from Mexico's oil boom, averaged over 6 percent annually during the seventies.

Mexican price policies represent a critical element in the demand for wheat because bread is one of the more heavily subsidized consumer food items. Consumer wheat prices, along with other basic staples, have been administered by the government for many years. The real consumer price of wheat bread fell dramatically after 1976 because prices were not fully adjusted to account for inflation (fig. 1). The political rationale for this policy was to provide basic foods at low prices for the country's poor. However, in the case of wheat, benefits accrue mostly to urban consumers, rich and poor alike.

Figure 1

Mexico: Real consumer price of wheat



Conclusions

The Mexican economy is changing in several important ways. It will likely be many years before the economy recovers fully from its current financial difficulties. Falling world oil prices threaten to further restrict an already weakened economy through stricter austerity measures. The government is expected to move away from its predominant control of agricultural marketing that was once subject more to domestic political considerations than to changing economic circumstances. The changed economic environment and proposed changes in domestic price policy will affect the forecast of wheat production and demand.

The government will be severely restricted in its ability to maintain subsidies as in the past. In the short run, lower producer subsidies will mean higher production costs and reduced output if world commodity prices do not increase much over current levels. Slower economic growth will reduce wheat demand because of declining real incomes. Demand for wheat will also be dampened in the short run by higher costs as consumer price subsidies are reduced or eliminated.

In the longer run, changes in trade and domestic economic policies could make the Mexican wheat market more sensitive to changes in international conditions. This would primarily be accomplished by the establishment of market interest rates, a move toward equilibrium exchange rates, the deregulation of domestic prices, and the removal of nontariff trade barriers. These changes would contribute to a reallocation of domestic resources because of changing price relationships. They would also make domestic prices of tradables (outputs and inputs) more sensitive to international price changes.

The implications of these changes for U.S.-Mexican trade are mixed. The United States could benefit from a more open economy that lessens political decisions with regard to trade. By continuing to offer export credit guarantees, the United States may be able to maintain a competitive edge in Mexico's import market. However, the United States may face stiffer price competition because of the world grain surplus and Mexico's limited foreign exchange reserves. An important consideration for the next few years is that the current Mexican wheat import market is small and is limited to feed wheat. The market would have to grow significantly and to diversify before suppliers would again compete rigorously for Mexican wheat purchases.

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THE BRAZILIAN WHEAT MARKET

Edward W. Allen

Brazil is a major importer of wheat and has no plans to reach self-sufficiency in wheat production. Despite large Government subsidies to growers, production usually accounts for one-third to two-thirds of consumption. Consumers are also subsidized, as wheat is sold to mills below the world price. Neither consumers nor producers respond to world prices, but production and consumption variability is passed on to world markets through Government imports. Government policy, weather, and wheat exporters' nonprice marketing strategies determine Brazil's wheat production, consumption, and trade more than do world price levels. Declining world wheat prices ease the financial burden of consumption subsidies, but are unlikely to affect production policies in the short or medium term.

Trade

The Brazilian Government imports wheat through its wheat board by soliciting international tenders. Nonprice factors, particularly trade agreements and credit, are important determinants of which bids are accepted.

The United States, Canada, and Argentina are the main competitors for the Brazilian wheat market. Each has a different marketing strategy. The Canadians have signed long-term trade agreements with Brazil, promising to match U.S. credit terms and guaranteeing a stable market. This arrangement leaves Argentina and the United States as residual suppliers in a volatile market. The major U.S. marketing tool in Brazil is General Sales Manager 102 Credit. G.S.M. 102 Credit helped the United States hold a high market share after 1980 when Brazil's foreign exchange was limited. Argentina can offer attractive prices, especially after their Southern Hemisphere harvest. Because Argentina and Brazil have set up a clearing account for bilateral trade, Argentina has a strong bargaining position. The account is usually heavily in favor of Brazil, so Argentina can simply say: "We do not have hard currency; if you want to be paid, take wheat."

Total wheat imports are determined by the amount production falls short of desired consumption. Imports reached a record 4.8 million tons in 1979. However, even between 1981 and 1984, when foreign exchange was quite limited, wheat imports remained at near-record levels, whereas nonfood imports fell dramatically. In 1985/86, imports fell because of record production. Over the next 10 years, a projected population growth of 2 percent and income growth of 4-5 percent would cause consumption to grow faster than expected production. Imports would then grow at a rate similar to the seventies, but imports would approach 1979's record only in years with weather-induced low yields. The consumption subsidy is an important source of changes in demand, and domestic production is the result of weather and farm price subsidies. The details of production and consumption are the major factors determining Brazil's wheat imports.

Production

Wheat is the only agricultural staple that Brazil has failed to grow in large quantities at prices competitive on world markets. It is difficult to grow wheat in Brazil because most of the country is either too warm or too humid for good yields. The pattern of freeze, rain, and rapid warming temperatures, typical in areas where wheat can be grown, results in ideal conditions for

smuts, rusts, and other diseases. Brazil has spent much of its agronomic research budget on research to improve wheat yields. Although its agronomists have had great successes with other crops and despite the availability of high-yielding varieties resulting from the Green Revolution, Brazilian wheat yields have trended up only slightly over time. When winter weather is unusually dry, yields improve dramatically, resulting in a wide year-to-year variability. Over the past 5 years, annual average yields have ranged from 650 to 1,500 kilos per hectare. In 1985, the average wheat yield reached 1.5 tons per hectare, exceeding the previous record by more than 25 percent. Most of the higher yield can be explained by favorable weather, but changes in growing practices probably also played a part. Changes in crop insurance regulations and high prices of wheat relative to soybeans encouraged farmers to pay greater attention to their wheat crops.

Wheat harvested area has also fluctuated widely. The farm price of wheat relative to other crops is important to the Brazilian farmers' decision to plant wheat. In the late sixties and early seventies, wheat and soybean area expanded together because the two were double-cropped. However, in the midseventies, soybean prices and yields increased rapidly. Because soybeans double-cropped with wheat have lower yields than single-cropped soybeans on the same land, soybean production may have become a substitute for wheat. In 1985, soybean prices were low relative to wheat, which was set at $248 per ton, farm gate, before fumigation. Wheat area expanded. However, it took a Government-supported farm price more than $100 per ton above world prices for Brazil to increase wheat area.

The government purchases all wheat grown, except for some wheat for seed. The government also purchases all wheat imports. Imports cost the government less than domestic production, thus creating a difficult dilemma. Food security issues push the government to encourage domestic production, but tight budgets encourage it to import. The government's setting of the farm price for wheat has become exceedingly political, pitting wheat farmers' political leverage against the demands of austerity. Since monetary reform in March 1986, it has been more difficult for Brazil to buy wheat by increasing the money supply. The complex political process that sets the farm price for wheat is difficult to predict, so the 10-year projections assume a standoff; wheat subsidies remain high enough to maintain, but not to increase, wheat area. Long-term projections of Brazilian wheat production are tenuous because of this political process and the high variability in yields and area.

Consumption

Government subsidies play a dominant role in Brazilian wheat consumption. Wheat is the only staple food Brazil has traditionally imported. Because of its importance in urban diets, wheat was of enough political and strategic importance for the government to take control of all procurement. Because wheat was the only major food passing through government hands, it became the easiest food to subsidize. However, it also meant that the only major food staple Brazil subsidizes is an import.

The Government subsidizes consumption by selling its wheat to millers according to traditional market share, but at a price lower than the import price. Flour and wheat product prices are then controlled, leaving the

processors a reasonable margin, but passing most of the subsidy on to the consumers. This system has caused several developments that would not have occurred under "normal" competition:

- Many small mills have managed to remain in business, even though they are not "efficient."
- The government has successfully promoted blending nonwheat flours in bread that, combined with the lower quality Soft wheat produced domestically, makes it preferable to import high-quality Hard wheat.
- Wheat is often the cheapest food, and bread has become extremely important in Brazilian diets, particularly in urban areas.

Both Brazil's method of fixing and changing consumption subsidies and its highly inflationary environment make it difficult to measure the wheat subsidy. The price of wheat to millers is fixed in local currency. It is adjusted at irregular intervals, often remaining unchanged for many months at a time. Meanwhile, the government purchases wheat from farmers or on the world market at prices fixed in dollars. In 1985, the exchange rate was adjusted every day to compensate for inflation, which was running over 200 percent a year. The level of the wheat subsidy also changed every day. The food riots of 1983 and the heavy weight of wheat in urban price indexes used to measure inflation made it politically difficult to raise flour prices. When the wheat price was increased, Brazil claimed the subsidy was reduced by a large percentage; however, after a few months of high inflation, the subsidy was as high as ever. Greatly reduced inflation in 1986 should make wheat consumption subsidies easier to measure. Projections for the next 10 years assume that the government will reduce consumer subsidies gradually, but not fast enough to decrease per capita consumption.

Research Needs

Brazil is the major market where the United States, Canada, and Argentina compete with each other without much interference from the EC or Australia. A model that explained the shifting market shares of these countries would be useful, particularly one that included nonprice marketing strategies.

The role of wheat in the Brazilian diet is fertile ground for research. The traditional diet included many nonwheat staples; however, as wheat became the cheapest food in urban areas and as the population became urbanized, wheat consumption increased. What are Brazilians' preferences? How much of the expanded wheat consumption is due to consumer subsidies? Brazilian millers claim that if they were allowed to advertise, they could increase per capita consumption of wheat even if consumption subsidies were eliminated.

THE CONDUCT OF WHEAT MARKETING IN NORTH AFRICA

George R. Gardner and David W. Skully

The geographic focus of this study is limited to four countries along the Mediterranean coast of North Africa: Morocco, Algeria, Tunisia, and Egypt. These nations are important in a global analysis of the world wheat market for two reasons: (1) they comprise a large and growing market for wheat imports, and they share an unusual and extremely inelastic demand structure; and (2) the oligopolistic structure of the world wheat market, combined with North African demand conditions, gives rise to fierce market-share competition among suppliers. There is extensive use of nonprice means of competition, especially of export credit programs that incorporate implicit subsidies.

The four nations have a combined population of 108 million. Together they account for about 12 percent of world wheat imports (14 million tons in 1985). Several common features influence their wheat imports. Wheat, particularly in the form of bread and couscous, is the mainstay of the diet. Consumer wheat products have been, and will continue to be, heavily subsidized. A kilo of bread in Egypt, for example, costs the consumer roughly 7 cents (U.S.). This tradition of consumer subsidies has generated high per-capita wheat consumption levels, and it is so entrenched in political expectations that significant real consumer price increases are highly unlikely. Consumption is, therefore, extremely predictable. Indeed, given the existence of subsidies which insulate consumers from world prices, consumption is essentially exogenous.

The decision to import wheat is made by state agencies, which strive to meet domestic consumption targets. Because consumption is essentially exogenous, domestic production is the primary determinant of import demand. Consequently, import demand is highly inelastic with respect to world price.

Supply Considerations

All four nations have been net wheat importers since the early sixties. Wheat production in North Africa is constrained by an arid climate and has not kept pace with population growth and per capita consumption. In Egypt, wheat is irrigated and intensively cultivated, with yields of 3.5 tons per hectare. There is little room for expansion on either the intensive or extensive margins. In the Maghreb region--Morocco, Algeria, and Tunisia--wheat is generally rain-fed and subject to erratic climatic conditions; yields are very volatile and average about 1 ton per hectare. Although increased attention has been given to agriculture in the eighties, dramatic improvements in yield are highly unlikely to close the gap between consumption and production. All four nations will remain net wheat importers as the gap widens. They will likely consume 30 million tons of wheat annually by 2000, most of which will be imported.

Market Structure and Competitive Conduct

The world wheat market, dominated by four major exporters, has a classic oligopolistic structure. The distinguishing characteristic of oligopolies is the interdependence of agents' behavior; strategic behavior--second- and third-guessing rivals' reactions--pervades market conduct. Nonprice means of competition are usually employed in oligopolistic markets, as they allow

sellers to disguise the resource cost terms of a sale from other sellers. Credit, because it can be used to place either a premium or a discount on the nominal price of a contract through intertemporal transfers, is a common form of nonprice competition, and the North African wheat market is permeated by exporter credit.

Because most of North Africa's wheat imports purchased under exporter credit contain some grant or subsidy element, for example, extended grace periods and lower-than-market interest rates, the effective present discounted cost of imported wheat can be substantially below the prevailing world price. Since the late seventies, when the European Community (EC) emerged as a major net wheat exporter, competition for market shares in North Africa has intensified. Export credit subsidy programs such as the French Compagnie Francaise d'Assurance pour le Commerce Exterieur (COFACE) credit and the U.S. General Sales Manager 102 (GSM-102) and Blended Credit emerged as the key instruments of competition. The present discounted cost of wheat purchased through these programs in the eighties has generally been about 80-90 percent of the world price. For wheat sold under U.S. P.L. 480, Title II, the cost has been as low as 12 percent of the world price. We conclude that the present discounted cost of wheat to the importer is what determines importer decisions and, ultimately, market shares. Competitiveness in export credit is at least as important as competitiveness in delivered prices. As long as the United States and the EC maintain large carryover stocks, export credit is likely to continue to be the dominant means of competition employed in the North African market.

Although this analysis focuses on the conduct of competition in the North African wheat market, we suggest that the factors responsible for conduct in this region are not necessarily unique to it. The world wheat market has a classic oligopolistic structure, and it stands to reason that the means of nonprice competition employed in North Africa are very likely employed in other wheat-importing markets.

Future research directions and needs in the general area of North African wheat market conduct include the following:

- Further investigation into the market structure;
- Research into the opportunity costs associated with the credit terms used in market-share competition;
- An analysis of how much of the cost of North African food subsidies is borne by wheat exporters vs. the governments of the importing nations;
- More investigation of the impact of recent EC wheat surpluses on the North African market;
- Analysis of wheat varietal preferences and switching, especially the importance of Durum and Semolina in the Maghreb; and
- Additional data collection and market-share analysis of wheat vs. wheat flour preferences in the region.

THE DYNAMICS OF CHINA'S WHEAT TRADE

Frederic M. Surls

China is the world's largest wheat producer (19.6 percent of 1985/86 production) and, despite falling imports, is still the third largest wheat importer (6.8 percent of world imports in 1985/86). Imports have varied markedly over the past 25 years. During the sixties and much of the seventies, policy and supply variables were the major factors determining grain import demand. Domestic demand factors are beginning to play a more important role.

Import Growth

If, as we currently expect, demand grows by about 4 percent annually over the next decade while production increases only 3 percent, the gap between quantity supplied and quantity demanded at current price levels will widen. Much of this gap is expected to translate into higher imports, which may rise to about 14 million tons by 1995/96 from their current 6-million-ton level.

This scenario assumes that, although the trade deficit and falling foreign exchange reserves are a serious problem for China now, they will not seriously constrain import levels over the long run. If balance-of-payments problems worsen, however, and if the growing domestic supply-demand gap at current price levels cannot be filled by imports, then China's policymakers will face difficult choices. The policy goals of stable food prices, of growing reliance on markets rather than on administrative means for allocating food supplies, and of holding down grain imports will be incompatible. Fundamental changes in food policy may be necessary if China decides to restrict imports.

Impacts of Policy on Imports

Changes in agricultural trade policy have been important in shifting the import demand for wheat. Wheat imports began in 1961 after several years of disastrous harvests and famine. Until then, China had been a grain exporter. Later in the sixties, China decided to institutionalize grain imports as an important part of the urban grain supply.

Another major policy shift occurred in the late seventies. China increased grain imports to improve grain supplies for selected rural areas to permit greater rural specialization and boost cash crop production. Higher grain imports were a necessary condition for the success of domestic agricultural policies. They were also part of a longrun program of import substitution that was designed to ultimately reduce imports of many agricultural products. To date, there has been little interest in, or attention to, questions of gains from international specialization; the leadership favors imports of industrial goods and technology over consumer goods.

Projections for the next decade assume no major changes in trade policy.

Production Growth

Wheat production has grown more rapidly than production of any other grain crop. Rising yields in all periods have accounted for most of the increase in output. Wheat area increased only 2.4 million hectares (8.8 percent) between the midfifties and 1984. The sustained growth of yields is the result of the

interaction of a complex set of factors: an expanding irrigation system, rapidly increasing supplies of chemical fertilizer, and the ongoing introduction of high-yielding varieties (table 1). The accelerated growth of wheat yields since the late seventies reflects the added impact of new agricultural policies: more incentives for crop production, better and less detailed planning, more regional specialization, and a return to more traditional cropping patterns.

Table 1--Wheat area, yield, and production: Average annual growth rate

Period	Production	Area	Yield
		Percent/year	
1949-59	5.6	1.6	3.9
1959-65	1.9	-.3	2.2
1965-77	5.7	1.3	4.4
1978-84	8.2	-.1	8.3

Over the next decade, output growth will slow, but how rapidly is a major source of uncertainty in supply projections. Area increases will be small, and yields will rise more slowly. An important part of the effect of the policy changes in the late seventies was a one-time yield gain due to more effective use of resources. This impact is largely over. Furthermore, fertilizer supplies will grow more slowly than in the late seventies and early eighties. Our projections show area increasing to 30 million hectares, a slight increase from the 1984 level. Yields are projected to increase to a level of about 3.9 tons per hectare by 1995. This projection put 1995 production at about 115 million tons, 30 percent over the 1984 record.

Utilization, the Growing Role of Demand

Despite serious data problems, we can make several generalizations about China's grain and wheat consumption. From the midfifties through the midseventies, population growth was the major driving force behind rising grain consumption. Per-capita grain consumption in the midseventies was little, if any, higher than in the midfifties. Grain was rationed for the entire period, and links between income and consumption were very weak. Per-capita wheat consumption did rise somewhat over the period as the process of substituting wheat for other grains began. This change was probably most marked in the urban areas, which received preferential treatment in grain supplies.

The determinants and patterns of grain consumption have changed since the late seventies. First, population growth has slowed to about 1 percent annually. Second, although per-capita grain consumption has risen slowly, per-capita wheat consumption has surged, rising about 50 percent since 1978. Wheat and rice are rapidly displacing coarse grains and potatoes in the diet of rural

China. This increase in per-capita wheat consumption reflects: (1) very rapid income growth of the last 8 years, (2) changing preferences, and (3) a drop in excess demand at state retail prices as the availability of wheat has improved.

Wheat stocks have probably risen in recent years, but they have not increased as much as stocks of rice and, especially, coarse grains. Feed use of wheat may now be about 4 million tons annually. Feed use probably rises on a local basis during years of excellent harvests.

With economic policy moving away from consumption controls, demand will likely become a far more important determinant of wheat consumption and import demand. Both Chinese and Western economic projections show rapid rates of growth of real income over the next decade. Given the apparently high income elasticity of demand for wheat, demand for wheat will grow rapidly. If real gross national product (GNP) grows by 6 percent annually (the lower end of the range of current estimates), if the income elasticity of demand for wheat is about 0.5, and if population grows 1 percent annually as expected, demand for wheat could shift an average 4 percent per year over the next decade. Additional sources of demand growth include modest requirements for increasing stocks and improvements in the milling industry. The average milling rate in China is reportedly about 85 percent. Expanded and upgraded milling capacity will increase the amount of wheat required to produce each ton of flour.

Needs for Future Research

The major supply-side uncertainty in the outlook for the next decade is how rapidly yield growth will slow. There are major gaps in our understanding of yield potential, of supply response, and of the substitutability among crops. The International Food Policy Research Institute and the Chinese Academy of Agricultural Sciences have a major project on wheat regions and yield potential underway. Data availability is approaching the point where production function analysis is possible. In addition to quantitative work, much needs to be done to explain what is happening to rural institutions, how the decisionmaking environment in which producers operate is changing, and precisely how plans and markets interact.

A fundamental problem in analyzing wheat and other grains in China is the lack of utilization data. There are no official data on wheat consumption, waste, or stocks. ERS is currently working to generate utilization estimates (total consumption, feed use, and stocks) for individual grains from the fragmentary data now available. American economists should take every opportunity to encourage Chinese officials and economists to publish the extensive utilization data that they have collected (and other kinds of data as well).

Much work needs to be done on the demand for wheat and other grains. For example, is the enormous increase in per capita consumption over the last 8 years the result of higher incomes? In this case, the income elasticity of demand is quite high. However, the rise in consumption may be in part simply the rapid reduction of excess demand at the state-set retail prices that prevailed during the period when wheat supplies were increasing. If this proves to be the case, then future demand growth will be much lower than is projected here. China has conducted extensive income and expenditure surveys that should provide data for both time-series and cross-sectional studies of consumption.

Finally, we need to know far more about the responsiveness of imports to changes in world market prices. Until now the response mechanism has been an administrative one involving the budgets and foreign exchange allocations of Ceroils, the grain trading agency. We have little idea how this mechanism works or how much imports have responded to changing world market prices.

THE SOVIET WHEAT MARKET

Emily Moore

The USSR will remain a major wheat importer through 1995, as modest increases in production will fail to offset increases in demand for wheat for food and feed. However, annual average imports could be more than 30 percent below the 1981-85 average if increased investment in agriculture and improved agronomic practices are translated into higher wheat yields in the long run. Possible changes in Soviet agricultural policy, such as increases in retail bread and livestock product prices, could dampen the demand for grain.

Soviet foreign exchange earnings may drop $5-$7 billion between 1985 and 1986. Although this drop will likely be temporary, the USSR will be more willing to make substitutions among grain types and suppliers to minimize the costs of its grain import program. The abundance of wheat supplies will continue to give the USSR leverage in the world wheat market. The United States will need to be price competitive to boost its share of the Soviet wheat import market.

Modest Increases in Wheat Production by 1995

The USSR has continually sought self-sufficiency in grains. Khruschev's New Lands policy brought over 18 million additional hectares of wheat into production in more arid eastern areas as a means of increasing total wheat output. Since the midsixties, as Soviet policies have expanded feed and forage area at the expense of wheat area, efforts to increase wheat production have concentrated on increasing and stabilizing yields. Wheat area was reduced an average of almost 1 million hectares per year in 1965-85. Intensification has done little in the past 10 years to boost Soviet wheat yields, however. Estimated Soviet wheat yields in 1980-85 averaged about 1.5 tons per hectare, about 40 percent below U.S. yields, 30 percent below Canadian yields, and 38 percent below Chinese yields. Wheat yield fluctuations in the USSR ranged from 1 to 65 percent per year in 1965-80.

Since 1982, the USSR has called its program to increase and stabilize yields through improved agronomic practices "intensive technology" (modern agronomic techniques). Between 1984 and 1986, intensive technology has been extended from about 1 million hectares of grain to 31.3 million hectares. Wheat accounts for 83 percent of the intensive area in 1986. The intensive program will probably have only a marginal impact on wheat yields because of low-quality inputs and poor coordination between input industries and farms. Soviet wheat yields are likely to continue to vary substantially from year to year because of weather. USDA's Economic Research Service (ERS) baseline forecasts that Soviet wheat production will increase about 1.5 percent per year from 1986 to 1995. Wheat production in 1995 is forecast to be below the bumper harvests of 1978, 1976, and 1966.

The USSR uses administratively set prices to reinforce wheat production goals. Soviet farm-level prices vary by republic, by region, and often by farm to ensure farm profitability. Although information on producer prices is fragmentary and data on production costs are nonexistent, grain production is reportedly very profitable. In 1985, the USSR raised procurement prices and quality bonuses for Hard and Durum wheats. This price increase is a sign of continued Soviet desire to reduce dependence on food wheat imports. Wheat pricing policies, however, have little impact on total wheat output because input allocation and crop mix are firmly constrained by plan guidelines.

Wheat Use Above Western Levels

The Soviet commitment to low and stable food prices has contributed to the strong demand for wheat. Prices for bread and pasta have not changed since the early sixties. The low price of bread and pasta, combined with the shortages of other foods (including animal products, vegetables, fruits, and oils) and consumer goods in general, has kept per-capita grain consumption (primarily wheat) over 133 kilograms annually and has led to such distortions as bread being fed to livestock or simply wasted after retail purchase. Because prices have remained constant, it is difficult to measure the price elasticity of demand for wheat in the USSR. Estimates of income elasticities of demand indicate that bread is an inferior product for high-income groups. The lowest Soviet income groups have a slightly inelastic demand for bread. A substantial increase in Soviet bread prices is thought unlikely, but is more possible under Gorbachev than under his predecessors. Gorbachev has criticized bread waste in much the same way that he campaigned against alcoholism. Increases in retail bread prices, like the anti-alcohol campaign, would be unpopular, but possibly accepted as necessary.

Modest improvements in the availability of other foods, especially animal products, and gradual increases in income should continue to decrease per-capita consumption of bread products. With population forecast to grow at its current rate of 1 percent, consumption of food wheat should increase only 5 percent to 39 million tons by 1995. Wheat for food use is forecast to account for only 38 percent of the domestic crop by 1995, compared with 45 percent in 1985.

Wheat is a major feed crop because of its yield advantage over many coarse grain crops under Soviet climatic and agronomic conditions and because much of the domestic wheat harvest is of substandard milling quality. Since the seventies, Soviet policymakers have emphasized livestock production to boost per capita consumption of meat and dairy products. However, increases in coarse grain, grass, and succulent feed production were unable to accommodate planned growth in the livestock sector. The USSR fed 41 million tons of wheat on average between 1980 and 1985, 49 percent of output. Wheat will remain a major feed crop as the USSR continues to produce large quantities of substandard milling wheat, but requires additional grain supplies to augment forage and coarse grain production. Demand for feed wheat is estimated to reach nearly 48 million tons by 1995, 48 percent of the domestic crop. Increases in retail prices for livestock products, possible under Gorbachev, could dampen growth in grain produced for feed.

Possible Decline in Soviet Wheat Imports

During the sixties, annual declines in grain production were offset by reductions in stocks, exports, and animal inventories. The emphasis on meat consumption in the seventies led the USSR to change its import policies. Not only did imports, rather than livestock inventory reductions, become the primary tool for dealing with crop shortfalls, but the USSR used imports to push herd building and livestock production. The USSR imported not only coarse grains, but wheat. The USSR needed foreign milling wheat to supplement domestic supplies because high-quality wheat area had been diverted to coarse grain production. The USSR has recently replaced some of its coarse grain imports with feed wheat because of attractive feed wheat prices from the Economic Community (EC). Soviet wheat imports between 1975 and 1985 averaged 14.5 million tons per year, 13 percent of total world wheat imports. Wheat

imports since 1981 have been particularly heavy because of bad weather in the Soviet wheat belt, reduced wheat area and quality, and availability of feed wheat at low prices. Annual Soviet wheat imports averaged 21 million tons between 1981 and 1984, an average 19 percent of total world wheat imports.

The Soviet decision to push the livestock sector with imported grains was likely prompted by substantially increased hard currency earnings in the seventies, by improved terms of trade for oil versus grain, and by an improvement in U.S.-USSR relations in the early seventies. Increased production of petroleum products allowed the USSR to boost its volume of oil and natural gas exports 2.5 times and 8 times, respectively, between 1970 and 1984. The Soviets also took advantage of dramatic increases in petroleum prices set by the Organization of Petroleum Exporting Countries (OPEC) during the seventies. Thus, Soviet hard currency earnings from petroleum exports increased 35 times from 1970 to 1984; earnings from natural gas sales rose from $14 million to $3.8 billion.

Increases in world oil and gas prices outpaced increases in world grain prices during the seventies, so that, in addition to having larger foreign exchange earnings, the USSR improved its terms of trade for oil and grain. In 1970, world oil and grain prices meant that the USSR had to sell over 40 barrels of oil to the West to buy a ton of grain. By 1975, the USSR had to sell only about 14 barrels; by 1982, only about 5 barrels. A similarly dramatic change occurred in the relative prices of gold and wheat.

Estimates of Soviet price elasticity of import demand for wheat range from 0 to over 1. It is difficult to measure price elasticities for centrally planned economies because consumers and producers are isolated from world prices. However, planners are probably sensitive to price in the short run as they want to import maximum amounts of grain, given specific foreign exchange allocation. The seasonal pattern in Soviet wheat purchases indicates that Soviet traders are at least sensitive to month-to-month price fluctuations. In the long run, Soviet planners are price-sensitive because they must weigh the opportunity costs of importing grain against investment in domestic production.

Soviet trade decisions are the result not only of domestic supply and market conditions for various commodities. Foreign policy considerations also are important. In the early seventies, Soviet relations with the world's largest grain exporter--the United States--improved substantially. Thus, the United States was the major Soviet coarse grain and wheat supplier between 1972 and 1980. Similarly, political tensions that resulted in the grain embargo of 1980 still affect Soviet trade decisions.

The USSR still wants to improve domestic supplies of livestock products and will continue to require imported grain to maintain growth in the livestock sector. The yield advantages of wheat, combined with continued problems with wheat quality, will mean that substantial amounts of domestically produced wheat will be fed and that the USSR will continue to rely on imported milling wheat. The availability of feed wheats, competitively priced with coarse grains, might also lead the USSR to increase imports of feed wheat. However, Soviet energy production problems and lower world oil prices may constrain both hard currency earnings and grain imports. The USSR will likely become more price-sensitive and more willing to make substitutes among agricultural commodities and suppliers to reduce import costs.

ERS's baseline assumes that Soviet hard-currency problems will be temporary, that the USSR will borrow in the short term, and that grain will be a priority import item as the USSR tries to maintain growth in the livestock sector (at least until more convinced of the need for reassessing food production goals). ERS forecasts that Soviet wheat imports will average 14 million tons per year in the early nineties, down 33 percent from the 1981-85 average.

Need For Increasing U.S. Competitiveness

Soviet foreign trade officials are free to substitute among suppliers and grain types to minimize import costs, although this freedom may sometimes be limited by political considerations. With relatively low import requirements in the sixties, the USSR purchased most of its wheat from Canada and Australia. The United States preempted Canada's and Australia's positions in the seventies not only because of its ability to supply large quantities of wheat but also because of improved political relations. Soviet imports of U.S. wheat in 1972-79 averaged almost 4 million tons annually, about 50 percent of total Soviet wheat imports during this period. Canada remained a major Soviet wheat supplier in 1972-79, capturing an average of 23 percent of the market.

With the U.S. grain embargo in 1980, the U.S. market share dropped to 12 percent in 1980 and averaged only 21 percent in 1981-83. Since the embargo, a 50-percent increase in world wheat production, continued strained relations between the United States and the USSR, and the trade and pricing policies of the other exporters have left the United States a residual supplier. In years when it cannot meet its wheat needs from Argentina, Australia, the European Community, and Canada, the USSR turns to the U.S. market, as in 1984 when it took over 6 million tons of U.S. wheat. Drops in total Soviet wheat imports, however, mean that the United States loses both sales and its share. The U.S. role as residual supplier became even more apparent in 1984/85 when the USSR failed to meet the 4-million-ton minimum purchase requirement for wheat under the terms of U.S.-USSR Grain Agreement, although it purchased almost 17 million tons from other sources. In the first 7 months of the 1985/86 agreement year, the USSR bought only 153,000 tons of U.S. wheat, less than 4 percent of agreement requirements.

The United States will have to take major steps toward price and other forms of competitiveness if it hopes to gain a larger share of the Soviet wheat import market. Lower U.S. wheat prices and increased imports of Soviet industrial products are possible ways of competing with other major wheat exporters for the Soviet market. Improved political relations, such as granting the USSR Most Favored Nation status, might also boost U.S. wheat exports. The superiority of the U.S. distribution system will continue to make the United States a desirable source of wheat if the U.S. competitive position improves.

Further Research

There are major gaps in our knowledge of the Soviet wheat economy. Future research needs include the following:

- An investigation of Soviet ability to cost effectively increase domestic wheat production and quality;

- Additional research on Soviet wheat use;
- Research on the substitutability of wheat, coarse grains, and oilseeds in Soviet feed use;
- An analysis of the retail bread price structure, including price differentials by bread quality;
- Data on costs of production for wheat by type and quality;
- A more thorough analysis of the relationship between Soviet wheat imports and prices, including estimates of price elasticities of import demand and price transmission mechanisms;
- Research on the relationship between Soviet hard currency earnings, terms of trade, and grain imports; and;
- Research on the factors affecting Soviet choices among grain suppliers.

THE EAST EUROPEAN WHEAT MARKET

Robert Cummings

The East European wheat market, which expanded rapidly in the seventies, has shrunk steadily in the eighties. No significant recovery is expected through the midnineties. The U.S. wheat market, traditionally much smaller than that for coarse grains, will remain minimal because of competition from other suppliers and the high volume of intraregional wheat trade. High per-capita grain consumption levels, improved producer prices, reduced retail price subsidies, slow population growth rates, a stable livestock sector, and foreign exchange constraints account for this pessimistic outlook.

It is ironic that wheat's share in total grain imports has risen because of a dramatic decline in corn purchases. The large corn importers of the seventies--Czechoslovakia, East Germany, and Poland--have either cut back livestock production severely to bring this sector more in line with the domestic feed base or, as in East Germany's case, shifted to wheat and barley because of favorable terms from suppliers. Except for Poland and, to a lesser extent, East Germany and Yugoslavia, Eastern Europe is self-sufficient in wheat.

The Debt Crisis: Lower Imports and New Policies

In the early eighties, Eastern Europe entered a foreign debt crisis that caused major changes in agricultural production and trade policy. The continuing impact of the debt crisis will shape the region's future as a wheat market. Some of the borrowed money was used to import feed for expanded livestock production. By 1976-80, for example, Eastern Europe imported an annual average of 16 million tons of grain (5.6 million tons of wheat and 6 million tons of corn), but exported only 3.8 million tons. In 1971-75, annual average imports were only 10.3 million tons.

U.S. grain exports, particularly corn, benefited greatly. Total average grain exports rose from 2.9 million tons in 1971-75 to 7.2 million tons in 1976-80 (5.1 million tons of corn and 1.6 million tons of wheat). U.S. market share rose from 15 percent to 28 percent for wheat and from 73 percent to 85 percent for corn.

Commodity Credit Corporation (CCC) credit played an important role in supporting U.S. wheat sales. During the seventies, Hungary, Poland, Romania, and Yugoslavia were eligible for credit, but Poland was the only consistent user of wheat. From 1976-81, CCC export credits and credit guarantees financed between 33 percent and 100 percent of U.S. wheat exports to Poland, the largest U.S. customer in the region. Poland is no longer eligible for CCC credits or guarantees, the result of the Polish Government's imposition of martial law and outlawing of the Solidarity Union.

Late debt payments and political turmoil during the Solidarity Union period in Poland effectively shut off new lending to Eastern Europe. East European grain imports fell dramatically. By 1984, imports were down to 7.8 million tons (4.1 million tons for wheat and 1.2 million tons for corn). U.S. exports were 1.2 million tons, of which only 116,000 tons were wheat. Market share was 3 percent for wheat and 72 percent for corn.

Years of living on credit and reduced imports caused major changes in agricultural production and trade policies. Crop production is now the premier agricultural sector, as officials seek to increase the domestic feed base. Officials make extensive use of producer and input prices to implement plan objectives.

Changes in producer prices since the early eighties have greatly favored grain production at livestock's expense. Investment has shifted from livestock to crop production, and livestock numbers have fallen.

Conserving hard-currency supplies has become an overriding concern in Eastern Europe. Exports are being promoted, and imports are being cut drastically. Because most of Eastern Europe's farm imports have traditionally supported domestic food consumption, the austerity atmosphere of the eighties has caused drastic cutbacks. Poland has nearly balanced its agricultural trade after having had a $2-billion deficit in 1980. The region as a whole reduced its farm trade deficit by 54 percent between 1980 and 1984.

These factors, combined with supply and demand conditions, underpin the Economic Research Service (ERS) baseline forecast for the East European wheat trade through the early nineties. Average annual wheat imports in 1991-95 are forecast at 3.6 million tons. Poland (1.5-2 million tons) and East Germany (approximately 1 million tons) will be the major importers.

Expansion in Wheat Supply

Wheat production policy in Eastern Europe calls either for self-sufficiency or for higher exports, depending on the country. More favorable price, credit, and input policies for grain production have been adopted by all countries. The result has been a steady increase in yields and production. Average annual grain yields in 1981-85 were 3.65 tons/hectare, 8 percent above 1976-80 and were 22 percent higher than 1971-75. Much of the yield increase is attributable to Hungary, where yields rose 40 percent over the 10-year period.

Production has increased less than yields because of declines in area. Annual output in 1981-85 was 35.5 million tons, representing a 1.4-percent annual rise from 1971-75 and from 1976-80. Again, the percentage increase in output was largest in Hungary.

Growth in yields and production are forecast in the ERS baseline, assuming continued priority for grain production. Average production in 1991-95 is forecast at 44.7 million tons.

Slow Growth in Demand

There is no evidence to forecast a significant increase in wheat demand for Eastern Europe. Population growth is low; per-capita grain consumption is relatively high, but has a declining trend; retail price subsidies for food are generally being reduced; and feed use increases should not be significant. Total wheat consumption is forecast to grow 1.8 percent per year between 1985 and 1995, well below the 2.25-percent forecasted rise in annual output.

In 1980-84, Eastern Europe's annual population growth rate was 0.4 percent. The annual growth rate for population over the next 10 years is projected at only 0.3-0.4 percent.

Per-capita grain consumption (specific wheat data are not available) varies considerably by country, but is declining everywhere. Only in Poland could wheat consumption rise. Since 1982, rye flour has been increasingly substituted for wheat in Polish breads because of reduced wheat imports. Any increased consumption, however, will likely come from higher Polish production of high-gluten wheat before hard currency is spent on imports.

Part of the adjustment to the debt crisis has been to significantly lower retail price subsidies, except in East Germany. Across-the-board increases in retail food prices of 15-30 percent have not been uncommon. Additional increases are expected, although they will likely be more regular and less substantial. Subsidies remain large, nonetheless, and the link between production cost and retail price remains.

Wheat for feed use is forecast to rise only 1.9 percent annually between 1985 and 1995. This projection assumes a continued very slow recovery in the livestock sector from the declines of the early eighties, and a continuation of past use trends.

However, the substitution of wheat for coarse grains in feeding, as shown by the GDR's actions since 1983, makes any conclusions about future wheat use for feed tenuous. The East German shift resulted from favorable credit and sales agreements with Canada. Commercial considerations will ultimately determine which type of grain is imported for feed.

Although price may determine what type of grain is imported, the price elasticity of import demand for Eastern Europe is close to zero. Grain use is determined by central planners after consideration of a host of price and nonprice factors. The prices faced by grain users are administratively set and not necessarily related to prevailing world prices. Price responses by planners will be long term at best because of the rigidity of central planning. One can best understand grain trade behavior in Eastern Europe over the past decade by examining hard-currency and credit availability and livestock production policies.

Future Research Needs

It is impossible to overstate the importance of hard-currency availability to any analysis of East European import behavior. More work needs to be done in this area, including an examination of how foreign exchange is allocated to different imported commodities and at what level these decisions are made. Information on if or how the cost of foreign exchange expenditures are passed on to users of these commodities would be helpful to further work on elasticities.

A better understanding of the supply and utilization of all grains in each East European country is needed. Since the region is not homogeneous with regard to agricultural production, we need to consider each country separately before making blanket statements about the region.

Part VI

WHEAT COMPETITIVENESS CONFERENCE SUMMARY

ERS Competitiveness Research Working Group*

Economic investigation continues to be hampered by paradoxes of measurement and interpretation, especially when a complex array of intertwined and ever-changing forces are involved. This problem is particularly true of competitiveness. Recent events have forced us to become interested in what makes a nation competitive. Evidence has been mounting that suggests the United States has difficulty competing in specific markets. Export performance has been poor, and imports have been rising rapidly. In sectors as diverse as autos, steel, consumer electronics, textiles, and agriculture, U.S. firms have become more vulnerable to developments abroad.

The sudden drop in U.S. agricultural exports since 1981, especially for such a traditional leader as wheat, raises important questions about the nature of competition. The materials presented at this conference are part of a larger effort to systematically analyze U.S. competitiveness in world agricultural markets. A frequently asked question is: "Why has the U.S. share in some commodity markets been falling, if the United States is one of the, if not the, most efficient producer of those commodities?" In pursuit of information on this topic, research in the Economic Research Service (ERS) seeks to link the coverage of all relevant issues into a concise framework. As a starting point, we thought it would be instructive to develop a prototypical approach, using wheat as the example.

What Is Competitiveness?

"Competitiveness" was broadly defined as a nation's ability to produce and market products in international trade while earning a level of return on resources used to produce those products that is at least comparable to what those resources could earn elsewhere. Competitiveness requires the longrun capacity to be flexible in resource use. Otherwise the economy will falter because it will not be able to adjust to changing market conditions. This framework includes short- and long-term factors which affect both U.S. agriculture's position in relation to the rest of the domestic economy and its position relative to the agricultural sectors in the rest of the world.

Systematic conceptualization of the problem suggests the nation as the appropriate aggregation level for investigation. It also provides the scope for individual commodity analysis, for example, wheat. Hence, the study of competitiveness incorporates both micro- and macroeconomic approaches. The microeconomic approach does not consider the implications of financial markets. This aspect of competitiveness involves efficient (or profitable) patterns of world trade based on international differences in factor endowments, technology, and consumer preferences. In the absence of micropolicy distortions, the relative prices and the patterns of trade would be found.

The inclusion of money, expenditure flows, and macroeconomic policies greatly disturbs patterns of international trade. Money and thereby financial markets

*The working group consisted of John Sutton, James Langley, Mark Denbaly, Peter Perkins, Jerry Sharples, and Velmar Davis.

introduce (or explain) distortions in both monetary variables and relative prices. Deviations from the prescribed patterns of trade are, therefore, explained by financial distortions caused by macroeconomic forces.

The ability to adjust to changes in market conditions implies focusing on longer term dynamic aspects of market performance in a general equilibrium context rather than in a partial, static context. However, such a framework is easier to develop conceptually than empirically. Nonetheless, we have done what we could. Except for a few studies, we have taken a partial and static approach. We have focused on U.S. competitiveness in the world wheat market and avoided including other commodities or the effects of time.

Measures of Competitiveness

We encountered difficulty in finding appropriate measures of economic performance that reveal something about competitiveness. We eventually settled on using market share as the basic ex post facto measure of performance. Market share provides a convenient framework for assessing performance because we are interested in relative positions in a market and changes in those positions.

Measures of economic performance are many. They may be categorized into three broad levels of economic activity: (1) international (broad trade comparisons), (2) domestic (intersector comparisons), and (3) sectoral (microeconomics of trade in one commodity). Although our aim was to assess multiple measures, we focused on just a few because of time restrictions. Therefore, our list is incomplete and should be interpreted only as indicative of possible measures.

Organization of the Study

We call the Wheat Competitiveness Study a "prototype" for several reasons. We approached it as a learning device to help design future research on competitiveness. We were limited by a tight schedule. Little original research was done. However, the study enabled us to examine existing research results and data from a different perspective.

The Wheat Competitiveness Study consists of 23 projects. Although designed to generate separate research reports, they have some common themes. All projects focus on questions relating to U.S. competitiveness in the world wheat market. They focus on factors influencing the excess supply function for wheat in the United States and the excess supply and excess demand functions for major competitors and importers, respectively. The study goes beyond those functions to examine economic and political aspects of wheat consumption, production, and marketing.

Exporting Countries

In the long run, U.S. competitiveness in the world wheat market depends on its costs of production and marketing, adoption of new technology, and policies dealing with production control, grain marketing and trade, and the macroeconomy. These factors are generally within U.S. control. Our competitiveness also depends on those same factors as they are implemented by our major competitors.

Factors contributing to reduced U.S. competitiveness in wheat trade include commodity policies that have set support prices high relative to world prices and that have reduced supplies and raised prices by stockpiling and acreage-reduction programs. Monetary and fiscal policies that led to unprecedented Federal debt, high interest rates, and a strong dollar also helped reduce U.S. wheat sales abroad. Current policy that lowers support prices and provides for direct and indirect export subsidies should increase exports. The value of the dollar has dropped but not relative to that of currencies of major U.S. wheat competitors. Many contend that agricultural exports will not respond quickly to a weaker dollar because the world agricultural market is controlled more by government subsidies and long-term bilateral agreements than by market conditions. Furthermore, the world grain market is now glutted.

Comparative data suggest that the United States and France have higher cash costs per unit of production than do Argentina, Australia, and Canada. To be more relevant, international cost comparisons should include marketing costs because they can be a substantial part of the total costs of delivering wheat to foreign markets. For example, the cost of exporting Hard Red Winter Wheat to the USSR was estimated to be $54.80 per metric ton in 1984/85, or 60 percent of total cash expenses (variable and fixed) of producing that class of wheat in the Central Plains. Despite the long shipment from producing areas to export ports, the United States appears to be cost-competitive with Canada, Australia, and Argentina in the area of marketing costs. France had a cost advantage over the United States because of its short distance of shipment from producing areas to export ports.

U.S. wheat yields are expected to continue to increase 2 percent per year for the next 5 years, but lower wheat prices may slow the adoption of new, higher yielding varieties. French research into new varieties is well advanced and offers promise of continued rapid expansion in yields.

However, export expansion will depend on competitors' supply responses and policy changes. One should keep an eye on several significant factors in terms of competitors' responses:

1. European Community (EC) trade practices encourage and protect domestic wheat production. Will greater awareness of the expense of the Common Agricultural Program bring about a change in policy?

2. Australia's ability to respond to changes in the world market depends on development of varieties more suitable to its poor natural resource endowments for growing wheat and its ability to reduce marketing and handling costs.

3. Canada's grain sector is relatively mature. Significant area expansion is not anticipated. Severe climatic conditions continue to restrain adoption of new varieties.

4. Will Argentina's national policy of exploiting agriculture be significantly reversed to provide long-term, reliable support to agriculture? If so, the sector should become more efficient and could increase production of most commodities. Will wheat be one that expands?

Importing Countries

The role of importers is often overlooked in studies of competitiveness. The Wheat Study attempted to correct this oversight. Importers are important because they determine the market for which exporters compete. As long as exporters have different elasticities of export supply, their market shares will be influenced by the overall market size. Many economists hypothesize that the United States has the most elastic export supply and is, therefore, the residual supplier.

Nations import wheat because domestic consumption exceeds domestic production. In each importing region reviewed, domestic consumption is, and will probably continue to be, augmented by significant consumer subsidies for bread and other wheat products. However, government subsidies for other grains, oilseeds, and livestock products may alter wheat consumption habits over time. Another factor positively affecting wheat consumption is population growth, which has slowed in many countries, but remains high in Mexico and North Africa.

Substantial public investment in agricultural infrastructure has tended to pay off in Mexico and most of Eastern Europe, which have become essentially self-sufficient. Public investment has also considerably increased wheat production in the USSR and China. However, natural and climatic conditions in Brazil and North Africa have prevented wheat production from expanding.

In each of the six importing regions considered in this prototype study, government agencies control imports. Net results of the forces underlying consumption and production behavior suggest several tentative conclusions about these import decisions. Mexico, Eastern Europe, and Brazil seem not to be big growth markets for wheat imports from the United States. U.S. exports will continue to offset domestic crop shortfalls in Mexico and Eastern Europe and to fill the gap or when Argentina does not require Brazil to balance the Brazil/Argentina trade account with Argentine wheat exports. The USSR will likely continue to import wheat in relation to the size of its domestic crop. USSR imports, while trending upward in recent years, tend to be quite variable. The most significant growth trends in wheat imports are for North Africa and, to a lesser extent, for China. However, there are severe foreign exchange constraints on North African imports, requiring exporters to offer considerable discounts and easy credit terms.

There may be significant constraints on effective demand for wheat at market prices. Availability of credit is often mentioned as a major factor. Exporters able to offer the best credit and sales terms have an upper hand. Exporting nations have a stake in the continued economic development of importing nations because future increases in effective demand depend on continued increases in personal income and foreign exchange earnings.

One cannot conclude, from the information presented here, what direction world trade in wheat, or the U.S. share of this market, will take. Only six major importers are examined. But these six regions accounted for 46 percent of total U.S. wheat exports in 1983/84 and for 35 percent in 1984/85. Other significant importers of U.S. wheat are Central America (less Mexico), South America (less Brazil), Japan, and other Asian countries. Information on consumption, production, and trade trends in these regions are needed before any bottom-line evaluation of world trade in wheat can be made.

Macroeconomic Influences on Trade

In a shortrun, static framework, the monetary and fiscal policies have different impacts on U.S. wheat markets. Expansionary monetary policy generally benefits wheat producers and the public sector. However, its effects on wheat price and volume and the U.S. share of exports depends on the strength of export demand. Expansionary fiscal policy does not generally benefit producers or the public sector. Regardless of the level of export demand, fiscal expansion reduces price, volume, and U.S. share of wheat exports.

Exchange rates are an important determinant of changes in U.S. agricultural exports. It is important to identify country-by-country changes in dollar value of exchange rates. To simply take a trade-weighted index may be very misleading in terms of implications for movements in U.S. agricultural exports.

Over the period 1973-85, it took about 11 quarters to see the full effect of an exchange rate change on changes in exports. However, U.S. farm programs, including loan rates and target prices, were twice as important in terms of influencing U.S. agricultural exports as were exchange rates. Foreign income contributed only about one-tenth the impact on U.S. agricultural exports as did exchange rates.

Conclusions

Why has the U.S. market share of some commodities dropped? The Wheat Competitiveness Study has pointed out several factors, some under U.S. control and others outside U.S. control. Examples of the former are U.S. wheat policy and the macroeconomic policy of the recent past. By tending to support the world price in recent years, the United States has reduced its own exports and sent price signals to other exporters to produce and export more. The contractionary U.S. monetary policy of the early eighties depressed agricultural prices, increased the market rate of interest, and appreciated the dollar. U.S. producers face a market in which there is a shortage of foreign exchange to buy agricultural products in many overseas markets and in which some of this country's best customers in the past now produce a sufficient volume on their own. Of the countries studied, the USSR is perhaps the only large and solvent buyer, and Soviet demand rises and falls with the success of its own harvests. This situation leaves the major exporters in the unenviable position of being in an intense rivalry with their political allies to sell to their chief political adversary.

Is the United States the most efficient producer and marketer of wheat? There are some indications that it is not. Market signals indicate excess resources in the U.S. wheat production sector--for example, idled land, subsidized production, and growing carryover stocks. The data on average cost of production and marketing show the United States as a higher cost producer and marketer than both Canada and Argentina. These data, however, reflect the cost of excess resource use and subsidies to the sector. Costs adjust to price. A smaller U.S. wheat sector, without a subsidy, would produce less at lower cost. Adjustments would be made. Thus, current evidence of inefficiencies in resource use does not necessarily mean that the U.S. wheat sector could not compete on the world market in the absence of a subsidy. It does mean, however, that the current sector is out of equilibrium.

A country need not be competitive in every commodity to have a viable and growing agricultural sector. Loss of competitiveness for a single crop is crucial when a country (or even an individual farmer) has no other viable alternative. This is largely the situation of two major U.S. competitors, Australia and Canada.

We need a multicommodity framework to determine the relative costs and benefits of government budgetary expenditures and resource allocation decisions geared toward improving market share of one crop versus another. From an economic point of view, we need to know how much it costs society to hold a market share in wheat and in other commodities. Macroeconomic and financial constraints and inadequate investments in infrastructure may offset the potential competitiveness of otherwise efficient agricultural production sectors in some countries.

Part VII

COMMENTS FROM TRADE AND UNIVERSITY REVIEW PANELS ON ERS WHEAT COMPETITVENESS CONFERENCE

COMMENT 1

Harlan Burnstein

I have six major points to make. First, knowledge of both the major wheat-importing and wheat exporting countries is the principal prerequisite for any analysis of the nature of competition in world wheat markets. The country papers presented today were, therefore, much appreciated. Other papers, however, while addressing various characteristics of wheat supply or demand, failed to merge their results with the question of export competitiveness.

Second, I believe that too many papers addressed peripheral areas of inquiry because of their failure to adequately define the concept of competitiveness, which, I submit, is simply the ability to market products. It is not the ability to produce. I don't believe we ought to burden the concept unnecessarily with notions of optimal resource allocation, with competitive market structure, with the notion that our competitors are passive, or with lengthy discourses into the linkages with other sectors of the economy. To do so makes the task of understanding competitiveness more difficult. Nor is it necessary, at this point, to investigate comparative advantage or consider production potential. As long as governments influence export activity, there are likely to be divergences between what is and what ought to be. Understanding the impact of the interaction of international and domestic policies and export-pricing behavior among competitors is critical.

Third, competitiveness is an indicator of performance and is most applicable when one is considering the behavior of sellers in particular markets at particular times. For example, what is our ability to sell Hard Red wheat to South Korea next week at $100 a ton relative to the Australian Wheat Board's offer of $95? Competitiveness implies, at least to me, a shortrun question of performance. The question must be asked continuously because the phenomenon is dynamic. Our performance or ability to sell is likely to vary across classes of wheat, across countries, within a given marketing year, and over time.

Fourth, except for today's paper on North Africa and possibly a few others, I believe there was a general failure to view the world wheat trade as one characterized by an oligopolistic market structure: (1) few major sellers; (2) some product differentiation (protein, end-user, quality); (3) nonprice competition (credit terms); and (4) strong interdependence among market participants (strategic behavior among sellers). The product (wheat) is subject to annual variations in supply and demand in each country. These annual variations change the nature of competition between sellers from year to year. The adoption of the above economic framework increases the analytical burden for the econometrician, but it is the necessary baseline for analyzing the degree of competitiveness in world wheat markets. Econometric models that are based on static behavioral relationships provide limited insight. I believe this limitation was recognized in numerous papers presented yesterday.

Fifth, adoption of this framework facilitates the distinction between measuring or explaining the aggregate volume of exports (which may be more a function of the level of excess demand generated by shortfalls in production) and discerning the nature of competition in markets for which there are few, but multiple, suppliers.

Sixth, I found it ironic that there was a scarcity of information presented on variation of selling prices among the major suppliers (only presentations of export volume, or market shares, that is, ex post facto phenomena that mask interesting dynamic phenomena affecting export sales performance); nor was there much mention of the availability/variability of credit programs. If the United States is indeed losing its competitiveness based on price, why have we not seen some numbers illustrating the problem? Cost of production data are not sufficient because we want to understand how our goods (already produced) compete in export markets.

A research agenda should include the following items:

1. Establishing an export matrix for each country presenting annual volume exported by origin/class.

2. Establishing a data base on delivered prices--including costs, insurance and freight (c.i.f.)--for each origin/destination.

3. Identifying variation in market shares for each importing country. Where and when are we competitive? Where and when are we not competitive?

4. Explaining variations with regard to: (a) changes in exporters' exportable surplus, (b) delivered prices, (c) quality considerations, (d) credit terms, (e) long-term supply agreements, (f) political considerations, and (g) changes in excess demand levels.

Several questions need to be answered:

1. What is the nature of the pricing behavior of each major exporter? How does this behavior change:

    - Over time (annually) as exportable surplus changes?
    - Within a given market year?
    - By destination?
    - Relative to particular export competitors?

2. What is the nature of nonprice behavior (especially credit):

    - Over time (annually) as exportable surplus changes?
    - Within a given market year?
    - By destination?
    - Relative to particular export competitors?

3. What are the longer term constraints (political and fiscal) of such behavior?

4. What are the social costs/benefits (political and fiscal) of such behavior?

5. How will the nature of competitiveness change for each origin, if world wheat exportable surpluses grow?

6. What is the impact on competitiveness for the different export origins, if feed wheat supply and demand increases?

7. If social/political constraints affect the nature of competitiveness of a particular origin in wheat markets, what will be the subsequent policy response(s) at that origin? The policy responses from other origins?

8. As U.S. loan rates are reduced, how does the nature of competitiveness change?

COMMENT 2

Paul McAuliffe

In preparing this talk, I asked myself: What are the essential parts of competing in the world export market for the short term and the long term? Many of the speakers have addressed long-term competition, specifically the years 1990-2000.

We do not need to address ourselves to problems that far away. Our competitive problems are with us today in the 1986/87 season. Our company is concerned with U.S. competitiveness down the line, but it is even more concerned with immediate problems.

On what basis is the United States trying to compete in world wheat markets? We do an excellent job in producing wheat. Even with large set-aside programs, we have managed to gradually increase our production.

Where we really excel is in storing wheat. We have managed to store huge, even record, quantities of wheat. In fact, the U.S. Government has become the major buyer of wheat grown in the United States for the past two seasons.

Unfortunately, we do a poor job of exporting wheat and as a result our market share has declined annually since 1981.

In 1982 and 1985, wheat prices (f.o.b.) of U.S. competitors declined below the U.S. gross loan rate (Farmer Owned Reserve). They increased their market shares dramatically, while the Commodity Credit Corporation (CCC) took over immense quantities of wheat loan forfeitures.

The U.S. Secretary of Agriculture has the authority to make U.S. prices competitive with world prices. U.S. values are now roughly $15 per ton higher than our competitors' offers.

We do not support implementing a marketing loan in wheat. Given the current discount of competing offers, the lower prices offered in a marketing loan would probably not be sufficient to make us competitive in world wheat markets.

We need to offer wheat at competitive prices, regardless of how low that price is. We need to send a clear message to our competitors around the world that we will match any price offered. It is important that we break the concept of the U.S. price umbrella, a price other exporters use as a reference point in determining their sales prices. This situation has had the effect, particularly in 1982 and 1985, of forcing U.S. grain into the loan program as it was the best marketing option available to the farmer. Farmers must be given another option, otherwise they will continue to put their grain under loan for storage, instead of marketing it to end users. This should be the competitive goal of the United States: sell what you grow, don't store it.

The world has changed since the seventies. The world wheat market has gone from a seller's market to a buyer's market. We must face this reality and implement the provisions of the Food Security Act of 1985 that make U.S. exports competitive today, not by 1990.

Another problem that needs attention now and in future competitive studies is the problem of grain quality. Specifically, farmers have been growing quantity rather than quality because Government programs give an extra incentive for quantity versus quality (protein). Government programs need to be restructured to bring about quality production as well as quantity.

Some of the speakers at this conference addressed the use of price models to show the impact in 1984 of additional U.S. wheat exports, if U.S. loan rates had been 20 percent lower. Price models are of some value, but they must be tied to the real world situation. The year 1984 was a poor year to show changes in U.S. exports if prices were lower because it was a year marked by record Soviet imports, and it had the highest level of world wheat trade. Furthermore, Argentina would not have lost market share under the prices used in the model because it would have exported at those prices. It lacks sufficient storage facilities to hold 1.8 million metric tons of wheat beyond normal carryout stock levels.

Other speakers addressed potential and theoretical import levels in Egypt of 30 million metric tons by the turn of the century, compared with 7-8 million metric tons today. If this kind of demand were to take place, Egypt would need a massive port-building program to accommodate such high levels of imports. One needs to address logistical considerations when projecting demand levels. Otherwise, prices and supplies are meaningless.

I appreciate the opportunity to address this conference. Please take my comments in a constructive way. Again, I urge the group to address today's competitive problems and focus less on the problems that may or may not exist in 5-15 years.

COMMENT 3

Richard Gray

On the first day of the conference, we looked at many factors that may affect U.S. competitiveness in the wheat market from a macro, or worldwide, context. Today we heard about many of these factors on a country-by-country basis. But there seems to be a failure to link these two sets of information in a meaningful way.

The major purpose of this conference was to report progress on pilot studies designed to determine whether the United States is, and will continue to be, competitive in the world wheat market. Market share was suggested as a measure of competitiveness. But there are major problems with using market share as a measure of competitiveness:

1. Market share measures only one commodity.
2. If the U.S. land base is fully developed, it may be unreasonable to export to maintain market share as world production and wheat area expand. For example, Canada once had 40 percent of the wheat market.

The concept of competitiveness may be too abstract and too unclear to be the major focus of this study. Perhaps more specific questions should be addressed, such as:

1. What real wheat prices will exist in the future?
2. Given current policies, how much wheat will the United States produce and export at those prices?
3. Under those conditions, how much should the United States produce?

The demand side should not be overstated. World wheat consumption has shown consistent growth over the past 25 years under a wide range of economic conditions and prices.

The spatial equilibrium model presented by Jerry Sharples is a good framework to integrate country supply and demand curves into a model explaining price and trade flows. However, econometrically estimated supply functions are probably not very reliable for two reasons:

1. Real prices are outside the range of recent experience.
2. Supply response is not symmetrical because of the resource fixity within the agricultural sector.

We must use a microeconomic approach to improve these estimates. Only micro analysis at the farm level will allow us to examine the question of resource fixity and will give us some insight into alternate production technologies that may be adopted in light of declining prices.

Farm size, structure, and revenue in the major countries should be studied. Although these factors may have little direct effect on variable input use and output, they may affect Government policy, which will in turn affect supply.

When examining the effect of free trade, one needs to consider both Government interventions that may encourage consumption and curtail production (which increase world prices) and policies that tend to lower world prices.

COMMENT 4

Bernard F. Stanton

Emphasis on "competitiveness," in contrast to a somewhat more standard study of comparative advantage or relative efficiency, is both appropriate and timely. We compete, in fact, in many ways. One value of this study is to identify and consider some of the mechanisms of competition in an international market that fit neither the perfect competition model nor the oligopoly-oligopsony framework of intermediate theory.

The definitions of competitiveness are interesting and, I suppose, necessary. Looking at the one in Langley's paper made me stop and think. I believe the European Community (EC) is very competitive in the world sugar market, and they export, despite the definition. In principle, in a free, or generally open market, your basic definition seems reasonable and operational. But as we look at state trading and the group dynamics of many bundles of goods together, we have to wonder if, in a practical world (which is the one posed for analysis), the definition does not need more qualifiers or other requirements. Perhaps I am criticizing words rather than the basic concept. But dealing with the realities of the imperfectly competitive world is part of what this study is all about.

I commend the decision to use sovereign nations as the basic unit of inquiry. Insofar as whole trading blocks make decisions and hence compete as units, should individual nations be the basic units? Should Comecon, the EC, or the USSR be the units? Insofar as France, the United Kingdom, West Germany, Italy, and the EC-10 or EC-12 operate together, why not treat them as a unit? Insofar as logical blocks of similar countries are grouped, analyzing the group may be more meaningful.

The presentation by Perkins was balanced, informative, and insightful. I am sure you appreciated his participation in the project. Can you not continue to get his suggestions, counsel, and review after he returns to Australia? Continuing comment from a key individual in Canada might also be helpful.

The concept of "revealed competitive advantage," or "competitive edge," as defined and discussed by Perkins and Vollrath, is stimulating and is a good way to think about relative positions. Nevertheless, Vollrath's analysis, especially his projections, makes one wonder what positive differences mean in terms of potential shifts in market and in terms of the millions of tons involved in his scenario. The percentage changes up or down, measured against coefficients, are not in themselves very helpful analytically, particularly in relation to the other analyses.

The estimates from the world wheat trade model as presented by Sharples, despite all its assumptions, produced a set of numbers and coefficients that are easily related to statistics commonly used by most analysts.

In my view, <u>stocks of wheat</u>, particularly in the hands of the major exporting nations, deserve more attention. The sizes of stocks, in and of themselves, are powerful forces in the market and shape the expectations of farmers, traders, and buyers. Both the absolute and relative size of stocks and their location are considerations in trading behavior and pricing.

The relationships between feed grains and wheat are also important. Their linkage is a further complication in a large and difficult problem area. Specifically, the substitution relationships of wheat for feed grains in the richer or industrialized countries must be recognized, both on the supply and demand sides. In the EC, especially, barley is the next best alternative to wheat for many producers. Moreover, low-quality wheat regularly moves into livestock markets in the EC.

Are there some advantages to pursuing the components or major items that lead to competitiveness in international markets. I can list a few as examples:

1. Low cost or efficiency in farm production;

2. Low cost or efficiency in assembly, storage, and movement to port facilities;

3. Skills in delivering the quantities, qualities, and other added requirements of buyers;

4. Sources of subsidy or funding to compete on the basis of price and other requirements;

5. State trading or bilateral agreements in which wheat is combined with other key needs or commitments (the USSR and United States are obvious examples); and

6. Commitments to giving away parts of crops, Agency for International Development (AID) packages, and other programs.

The methodology used by Lin and McElroy, which examines the structure of costs (both production and marketing) has much to commend it. We need to look at the combination of production and marketing and its collective impact. Moreover, the location and extent of subsidy in the system may be important to recognize, even though the extent and proportion of the total will not change competitiveness.

A similar set of cost of production and marketing costs for each major exporter would be of interest analytically and would benefit from review by the representatives of the friendly competitors--Canada, Australia, EC, and perhaps Argentina.

It is easy to give too much attention to wheat yields when we make comparisons. Resources and climate have much to do with output per acre. Efficient production may well be at relatively low yields. The written commentary should recognize this sometimes misunderstood point.

We need to set priorities for examining the components of aggregate demand for wheat. We need to separate this demand in quantity among: (1) recipients of food aid or subsidized (large subsidy) exports; (2) hard-currency purchasers in developing countries; (3) hard-currency purchasers in industrialized countries; (4) purchasers who came in and out of the market when internal production is short, and (5) the share of the export market that is fully covered by state trading or bilateral beyond U.S. access.

It would be helpful to project world wheat demand by some grouping of countries. Likewise, projections of wheat use (demand) should be considered simultaneously, if possible. This kind of effort is difficult econometrically, unless done by countries or regions. Some kind of aggregation of results would also be helpful. It might be useful to compare such projections with economists from the EC, Canada, and Australia.

The presentation on supply and demand for North Africa was commendable. This effort is a good example of grouping countries for analysis.

COMMENT 5

Melvin D. Skold

The array of numerous researchers interested in the competitiveness of U.S. wheat in world markets has been impressive. Individuals have surely advanced some notions of competitiveness that a predesigned research program would have neglected. It is unfortunate that competitiveness is a new concept for economists, and it is difficult to know which elements are important and which are not.

Given this exposure to a wide variety of facts and perspectives, several issues arise:

1. Without a planned and organized approach, additivity and comparability among the varied components are lacking.

2. Little attention is given to structural issues, either domestic or foreign.

3. There seems to be a consensus that comparative costs of production (and marketing) are not important. Although rejecting traditional comparative advantage as the only dimension to competitiveness may be useful, it is probably too early to reject costs entirely as irrelevant.

4. There may have been too much assuming. So many results were based on: "If present policies continue," or "if such policies are discontinued," "X" will result.

Perkins noted that, for an industry to remain competitive, it must be able to attract resources and provide an economic return to those resources. I think a problem is that this market economy approach is one of the conceptual issues we face, and, when it comes to evaluating the international competitiveness, we don't know which costs are relevant or how to measure them. Our research has shown that government policies affect costs. So, we are caught in a circle. Costs shape policy, and policy shapes costs.

However, much can be gained if one pays attention to comparative production and marketing costs that reveal long- and short-term competitiveness among farmers in various nations. Of course, marketing costs would be included. As McElroy mentioned, when he is asked to compare U.S. production costs with those in other countries, he has a nearly impossible task because of differences in how data are developed, input costs are valued, and costs are presented. Perhaps the notion of development literature and the distinction between financial (cash) costs and economic (assigned opportunity costs or shadow pricing) costs is relevant. Such an approach can facilitate comparisons among market economies and planned economies that allocate a significant portion of their resources through nonmarket mechanisms. Of what relevance are land costs in a planned economy in which land is a public good, or are capital investments if they are the result of a planning decision rather than response to potential returns on investment?

Costs need to be associated with supply functions, at least in a structural context. Every country has different categories of producers operating with varied resource endowments. These structural differences will affect supply costs, distribution of costs between financial and economic components, and

ability to supply at various international price levels. Of course, governments can intervene and negate the importance of costs. But the extent or cost of subsidies is also useful information in a competitiveness study.

Sharples illustrated how government policies (for example, loan rates, and European Community (EC) export subsidies) affect competitiveness. It seems then that more research attention should be given to these alternatives. Can we predict the continuation of EC policies or of U.S. loan rates?

Important implications for further research are the following:

1. Analysts need a planned and more systematic approach. The country-subject matter approach needs to be organized into an effective system to research the competitiveness of wheat and other major traded commodities.

2. Analysts should pay more attention to supply costs, including structural dimensions, among all important wheat-producing countries, not just wheat-exporting countries. We need far more research on supplies in planned economies, particularly the USSR and China.

3. Because Yetley has shown that one can understand demand by looking at per capita consumption and population growth, demand analyses need to focus on substitution between wheat and other products and among various classes of wheat.

*U.S. Government Printing Office : 1987 - 180-917/60140